AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

AUGUST 15, 1958

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A CHILTON PUBLICATION

it's mainly a matter of TIMING!

But how do you really KNOW when a machine has reached retirement age?

ANY machine tool could be made to last *forever* — if you kept on maintaining and repairing it forever. In fact, if you put enough money into its maintenance, you could keep it "good as new" indefinitely. But there's an economic limit to the maintenance money you can spend. And there also comes a time when "good as new" is no longer *good enough!*

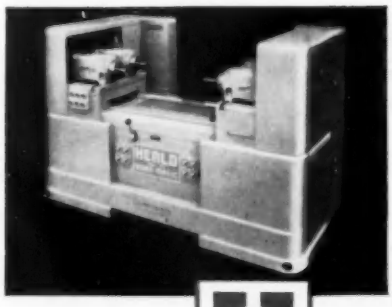
But, from the standpoint of production cost and return on investment, there *is* a mathematically predictable retirement age for any machine. Replacing it before this time is a waste of money. Retaining it *beyond* this time means a financial *loss* — often a substantial one!

Don't trust guesswork or rule-of-thumb computations to give you the right answer. There's too much money at stake.

Our sales engineers are well experienced in precise methods of replacement analysis. If you're in doubt — or would like to check your own figures — just call in your Heald engineer. He will be glad to help you. Similar obsolescence studies have effected many important savings.

For example: A diesel engine manufacturer asked for a replacement analysis on a 10-year-old boring machine, used to finish the I.D. of cam roller followers. It was found that a Model 322 Bore-Matic, like that shown at the right, would do the same job *50% faster*, with the following annual savings in operating cost:

	Old Machine	New Heald
Parts per hour	187	280
Parts per year (Req'd. Prod.)	374,000	374,000
Direct & Indirect Labor	$17,820	$9,400
Annual Maintenance	$750	$200
Annual Operating Cost	$18,570	$9,600
Annual Saving for New Machine		$8,970



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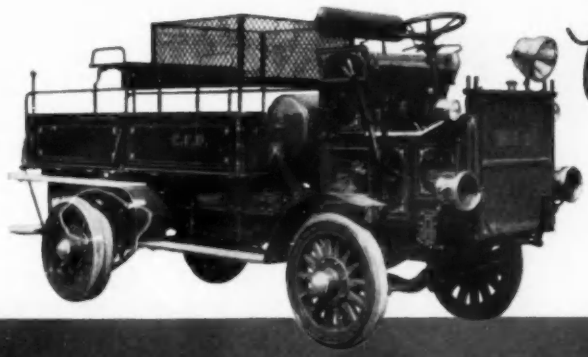

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A CHILTON MAGAZINE — PUBLISHED SEMI-MONTHLY

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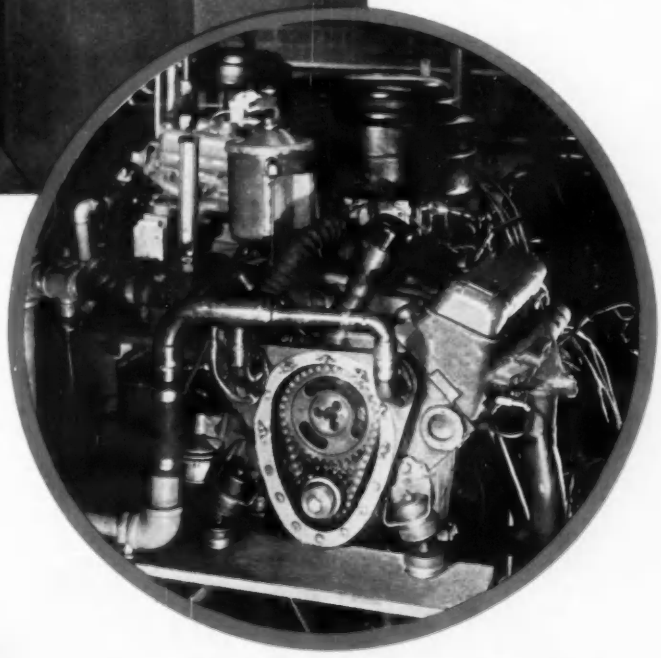

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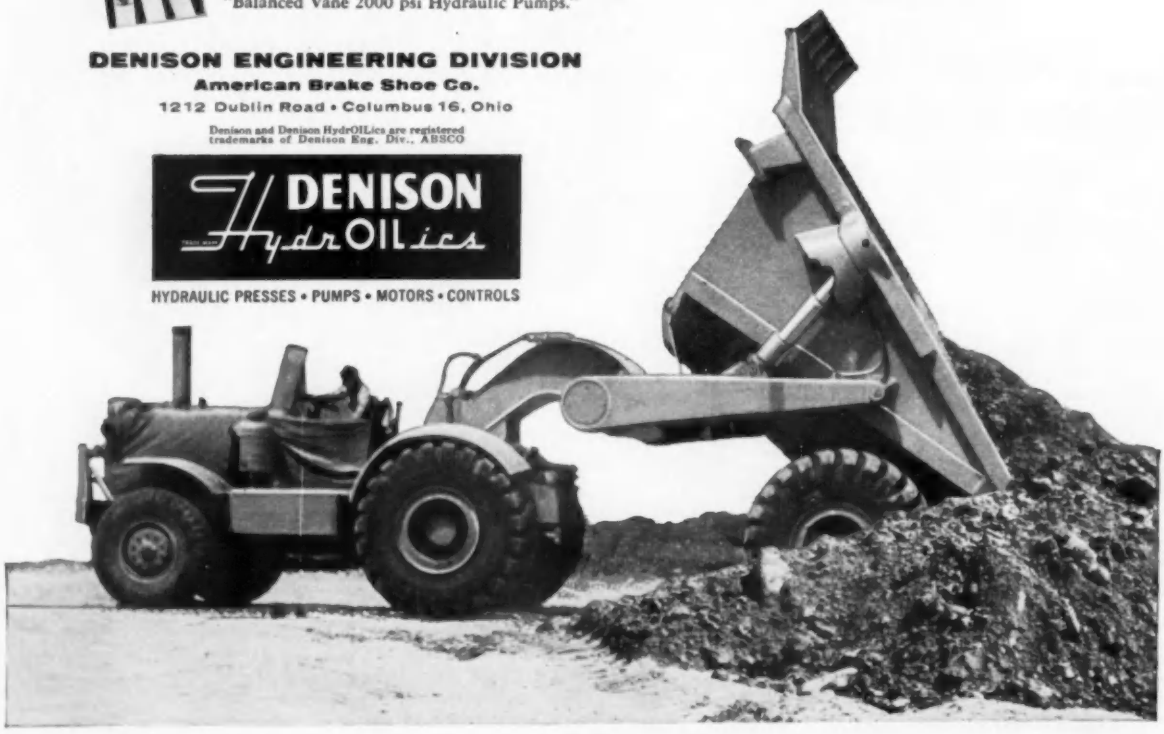
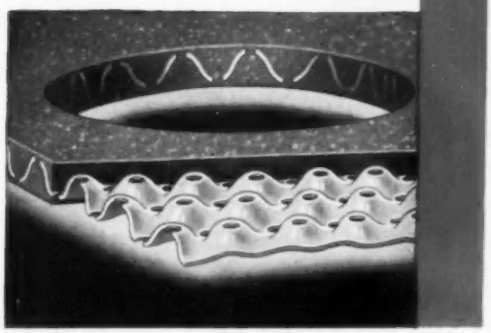


Victocor

new super-sealing gasket material



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% Compressibility at 1000 psi.	*10-15
% Recovery at 1000 psi.	35 min.
% Compressibility at 5000 psi.	*16-21
% Recovery at 5000 psi.	30 min.
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Corrosion resistance against aluminum, magnesium, steel and copper	Good

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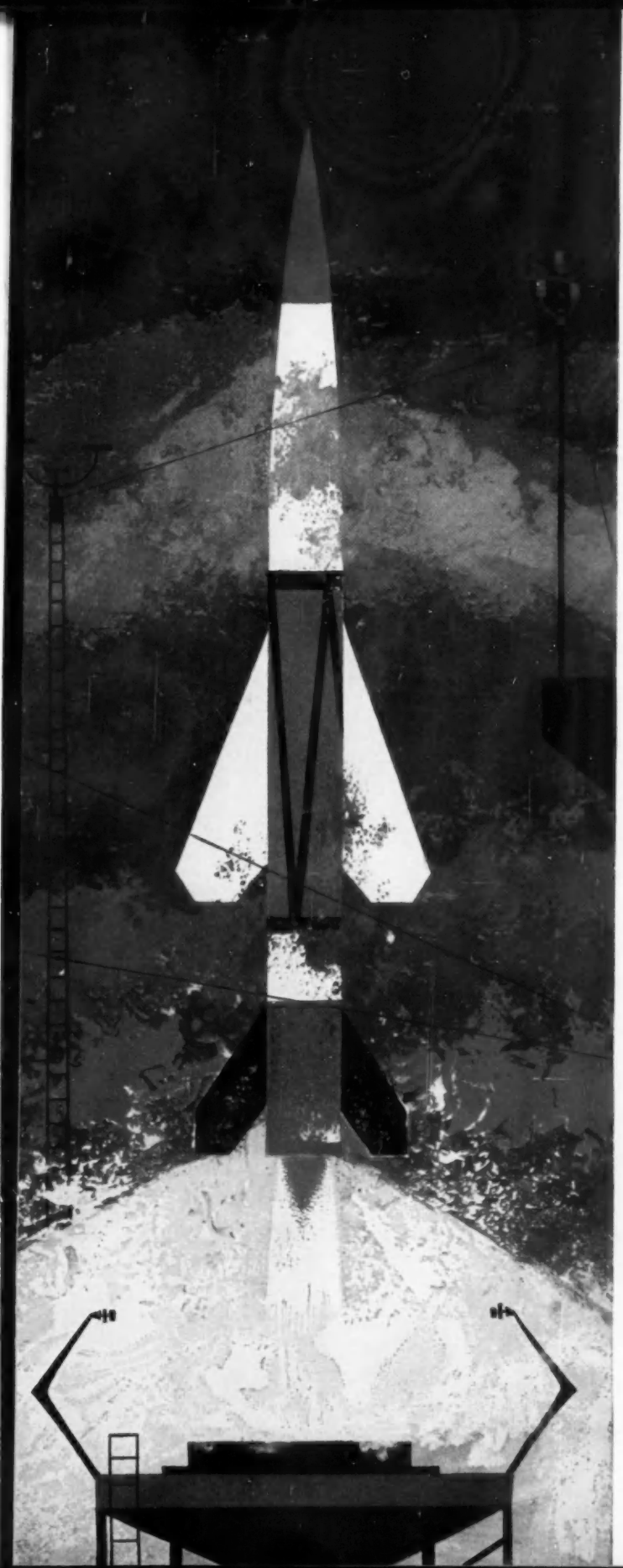

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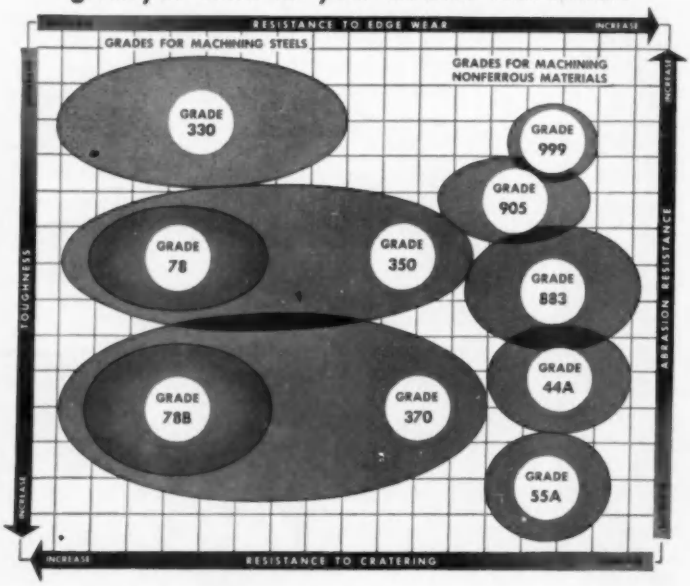

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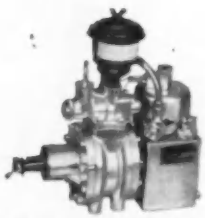

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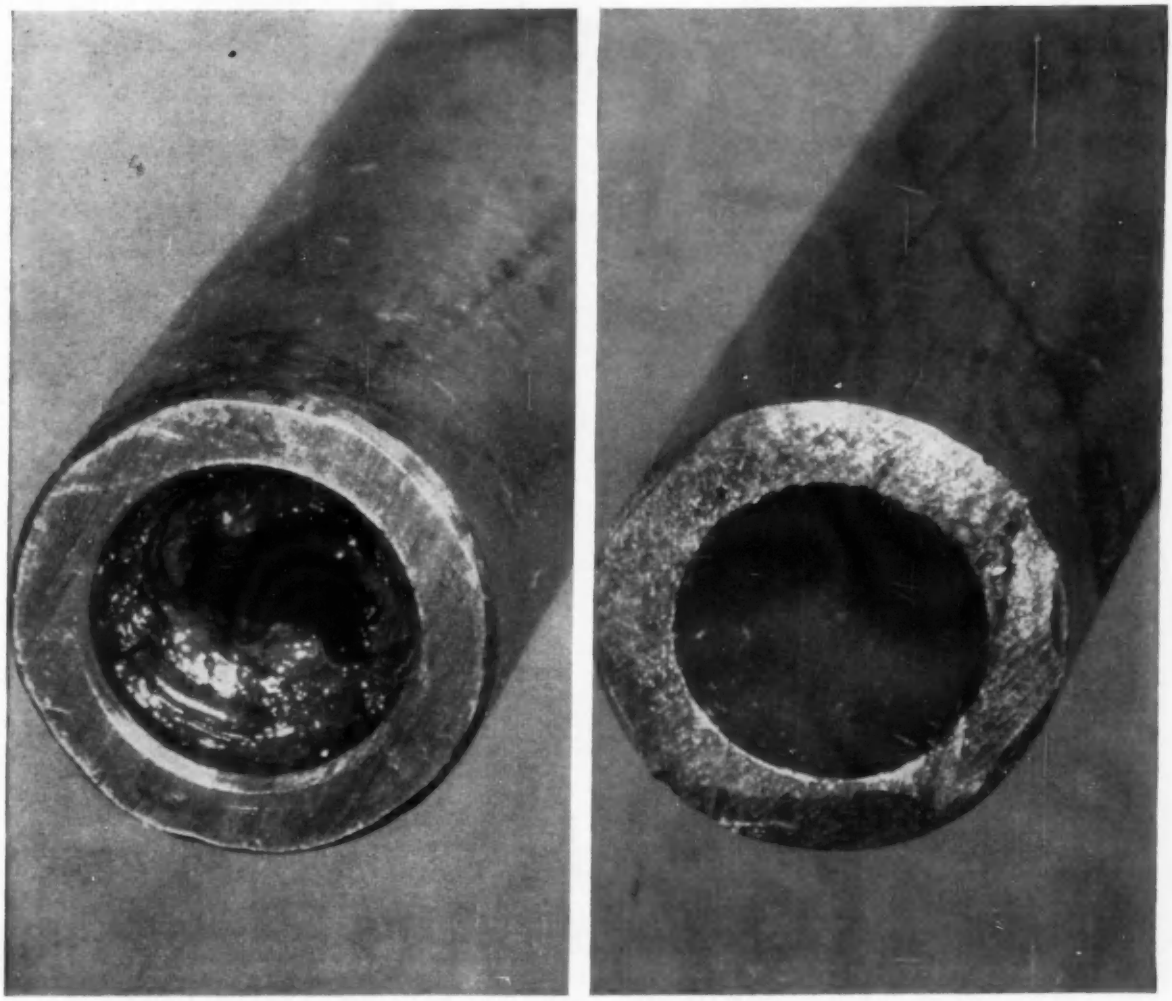

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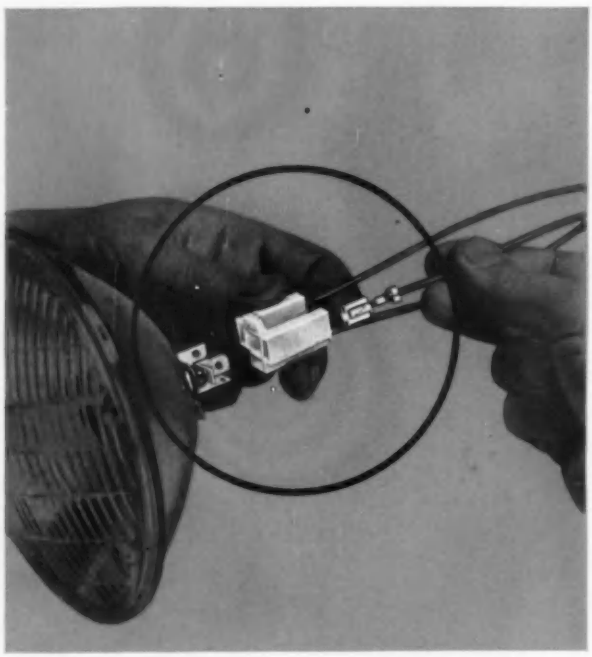

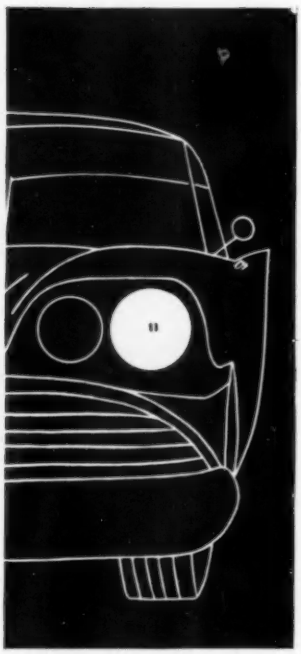

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Thor PORTABLE POWER TOOLS

Best control for pin-point load spotting!

Here's real husky lifting power—Thor's new compact, portable air hoist which can be handled easily by one man. Lifts up to 1000 lbs. Infinitely variable speed control from dead slow to 50 ft. per minute lift, 96 ft. per minute descent under full load—all in one hoist! Ask for Bulletin No. JE-2367 for complete details. Better yet, see a demonstration in your own plant!

Thor Power Tool Company
Prudential Plaza, Chicago 1, Ill.
Branches in all principal cities

Here's convincing proof with results certified by independent automotive authorities:

JENNERSTOWN TESTS

Jennerstown torture test runs prove . . .

Rigorous mountain test runs performed on the gruelling Jennerstown route have again demonstrated the superior performance of FAWICK (Girling) Brakes.

Using the industry's standard procedure, FAWICK (Girling) Brakes were subjected to 64 cross-country runs, 18 Laurel Mountain runs (fade test) and 9 performance curve runs—**twice the normal test amount.** The results shown here, certified by independent authorities, prove that FAWICK (Girling) Brakes lived up to their name—"The best brakes in the world".

FAWICK offers the lightest brakes with the best performance for driving, steering or dead axles for air, vacuum or hydraulic operation. Desired actuation can be installed without changing the foundation brake. FAWICK (Girling) hydraulic actuation is external and both FAWICK air and hydraulic brakes for driving axles incorporate the FAWICK "close-coupled" unit with integral actuation for **parking and emergency braking.** FAWICK (Neate) Hand Brake Control offers ultimate in application for parking and emergency braking.

For the most advanced heavy-duty brakes, specify FAWICK.

FRONT

Fawick (Girling) 2LS/1P Brake* with direct acting Fawick Air Diaphragm uses "two leading shoe" and "sliding shoe" principles for optimum performance.

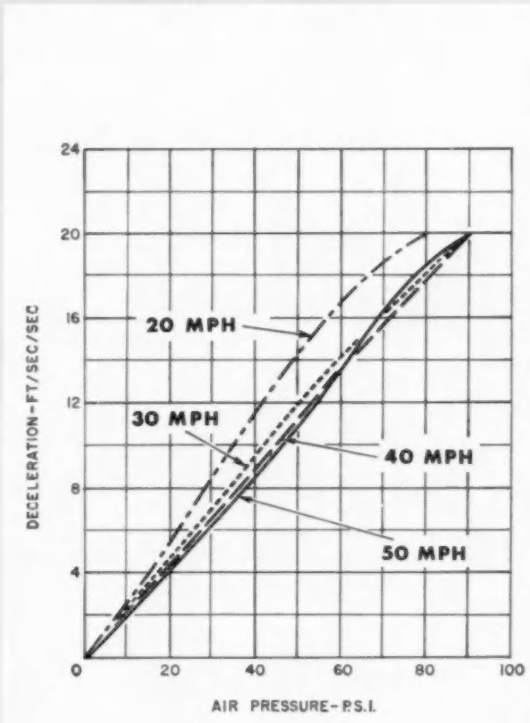
REAR

Fawick (Girling) 2LS/2P Brake* with "close-coupled" actuation and integral actuation for parking or emergency braking saves space and weight, eliminates drive line parking brake.

*Patented and pat. applied for.

PROVE SUPERIORITY OF FAWICK (GIRLING) BRAKES

. . . greater torque



Consistent deceleration through speed range—**certified by test authorities!**

. . . less wear . . .

After 64 test runs: all shoes had operational lining above rivets, max. diametral drum wear was .016", max. out-of-round was .002", no scoring.

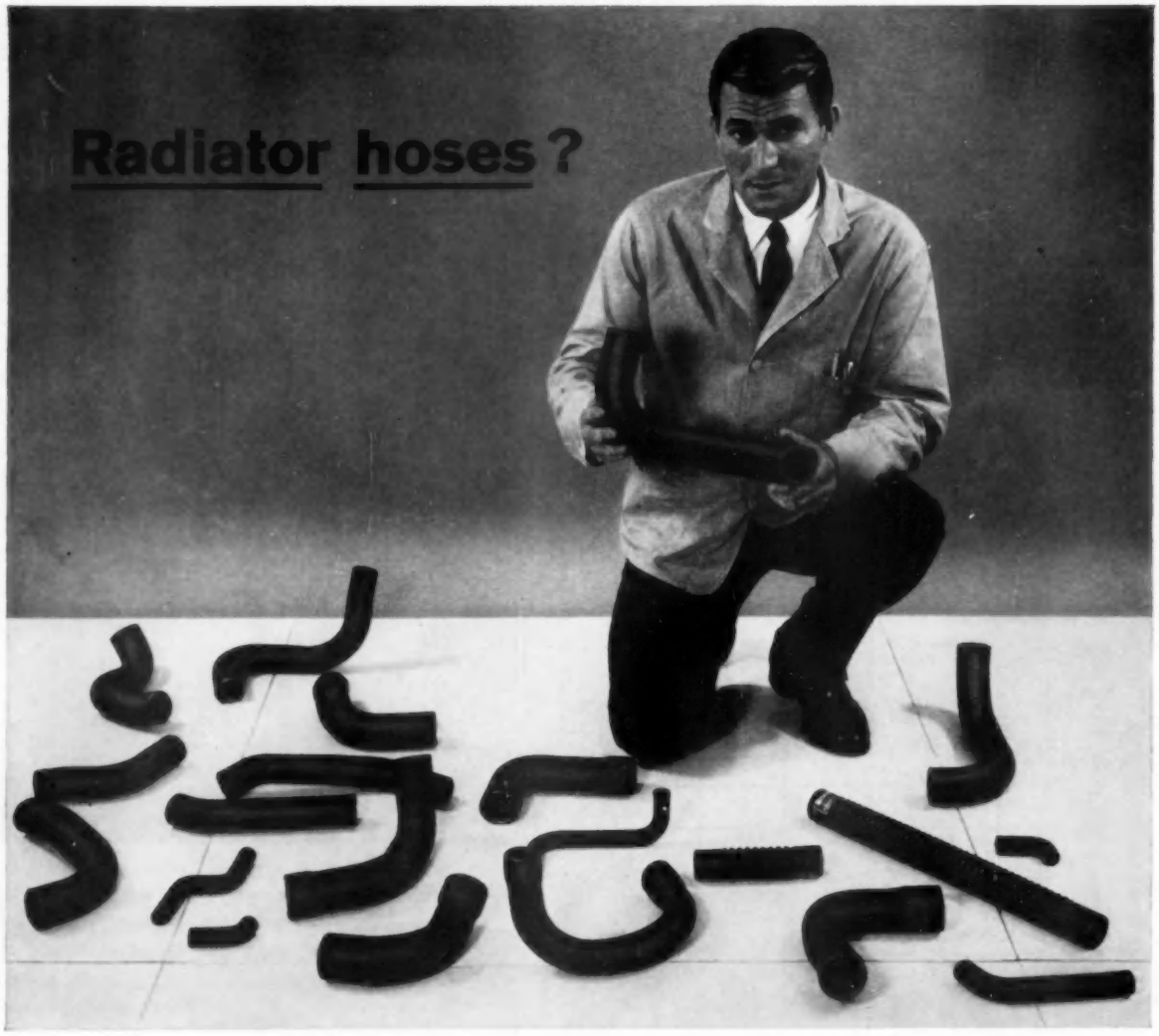
. . . *NO* fade!

No brake fade at any time—either with air or hydraulic!

Performance after fade test at 40 mph, 72 psi air or 1200 psi hydraulic—**16 ft/sec² deceleration.**

Equip your commercial vehicles with the brakes proved best in the world at Jennerstown— Fawick (Girling). For information, contact:

FAWICK BRAKE DIVISION CORPORATION
9921 CLINTON ROAD • CLEVELAND 9, OHIO



21 good reasons for specifying FORTISAN-36

21—count 'em—21 different radiator hoses shaped by FIRESTONE for specific automobiles. Fortisan-36 is their strong point. This remarkable reinforcing fiber lets you form and cure hose *easily* to any shape.

Its high tensile strength and stability mean better burst resistance with less weight. Plus longer life, greater flexibility than any square woven fabric. Ask Firestone—see how Fortisan-36 rayon takes the woes out of hose.

Celanese Corporation of America, Sales Development Dept., Textile Division, Charlotte, N. C.

Celanese® Fortisan®

DISTRICT SALES OFFICES: 180 Madison Ave., New York 18, N. Y. • Room 10-141 Merchandise Mart, Chicago 54, Illinois. P. O. Box 1414, Charlotte 1, N. C. • 200 Boylston St., Chestnut Hill 67, Mass. • 819 Santee St., Los Angeles, Calif.

EXPORT: Amcel Co., Inc. and Pan Amcel Co., Inc., 180 Madison Ave., New York 16, N. Y.

IN CANADA: Chemcell, Canadian Chemical & Cellulose Co., Ltd., 2035 Guy St., Montreal

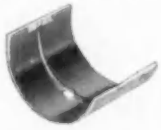
Fortisan-36...a Celanese industrial fiber

precision thrust washers with money-saving features!

Copper-alloy bearing surface on one or *both* faces of cold rolled steel. Slots, nibs, lugs to your design. Coined oil grooves—*no* costly machining. Write for the money-saving facts:

FEDERAL-MOGUL DIVISION

FEDERAL-MOGUL-BOWER BEARINGS, INC., 11037 SHOEMAKER, DETROIT 13, MICHIGAN



Copper-Alloy Lined

Spacer Tubes

Aluminum or Babbitt Lined

Plain & Bimetal Split Bushings

FEDERAL Mogul SINCE 1899

RESEARCH • DESIGN • METALLURGY • PRECISION MANUFACTURING

SKF RACES *Against Time...*

with the

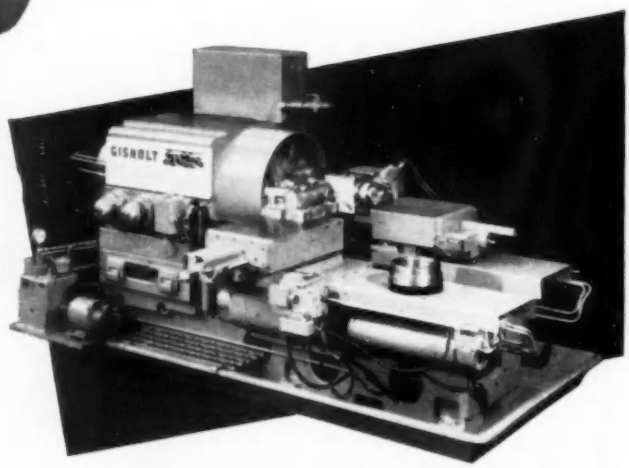
GISHOLT NO. 24 HYDRAULIC AUTOMATIC LATHE

When it comes to fast production of top quality spherical roller bearing races, SKF doesn't fool.

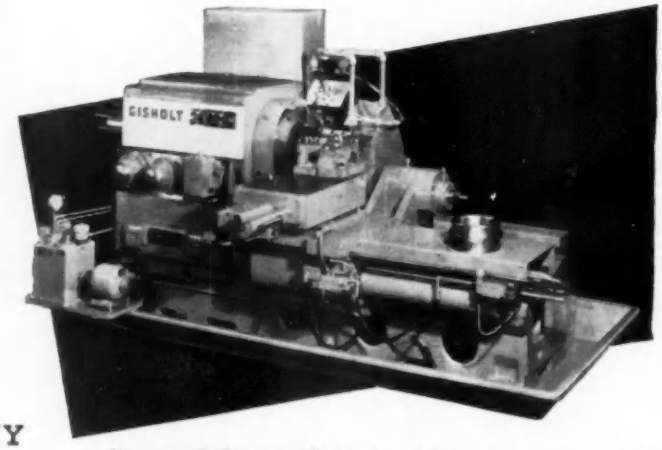
These big Gisholt No. 24 Hydraulics remove 34 lbs. of metal in two operations in a total of only 2.80 minutes' machining time on each of two machines. All cutting is on 52100 bearing steel and done at speeds of 325 to 350 f.p.m.

Speed is important, of course. But precision is the governing factor. How the Gisholt No. 24 does the job is a story that might mean real savings for you, too.

The No. 24 Hydraulic Automatic Lathe is a larger version of the famous No. 12 that has an outstanding success record on hundreds of jobs. If you have large volume precision work up to 24" diameter, the Gisholt No. 24 is the machine to investigate. Write for full information.



First Operation: Chucked on OD with 3-jaw hydraulic chuck, part is turned up to the jaws, faced, chamfered, bored and bore radius formed. Cam relief on rear tool block turns boring bit clear of workpiece as it is withdrawn.



Second Operation: Part held on expanding arbor by hydraulic pressure is finish turned, faced, chamfered and bore radius formed. Special rocker arm type carriage at rear tips in shaving tools to form both roller grooves with feed of .003" to .0045."

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

MASTERLINE GISHOLT SINCE 1887 GISHOLT

ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY-REBUILT MACHINES WITH NEW MACHINE GUARANTEE

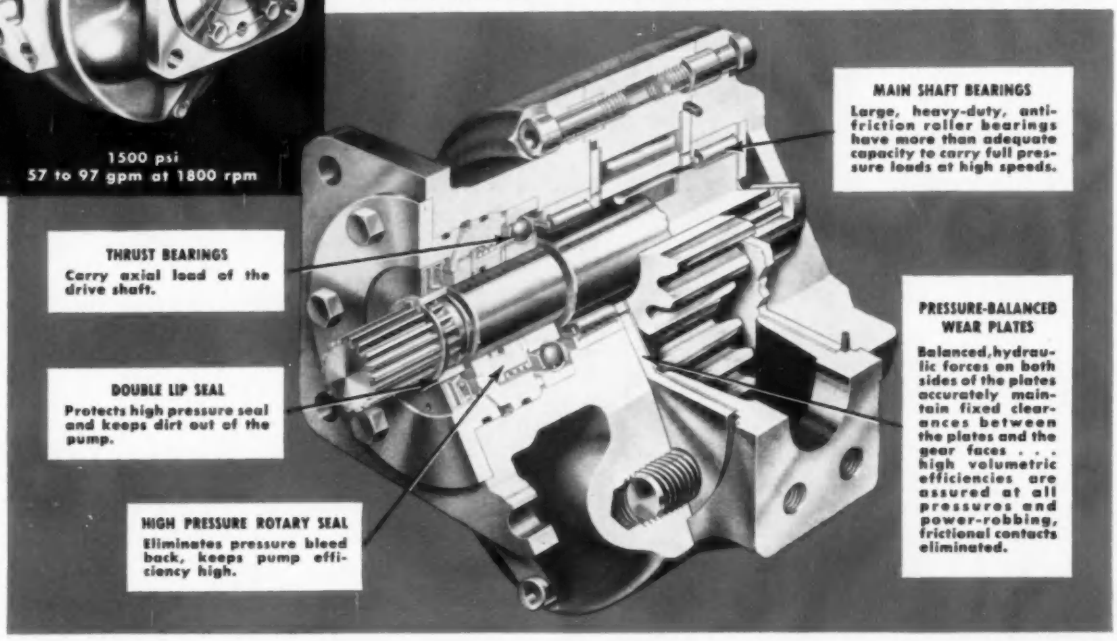
NOW • Added Service Life for the Accepted Leader Among Heavy Duty Fluid Power Pumps

HYDRECO®

Series 3000K

FLUID POWER PUMPS

1500 psi
57 to 97 gpm at 1800 rpm


MAIN SHAFT BEARINGS
Large, heavy-duty, anti-friction roller bearings have more than adequate capacity to carry full pressure loads at high speeds.
THRUST BEARINGS
Carry axial load of the drive shaft.
DOUBLE LIP SEAL
Protects high pressure seal and keeps dirt out of the pump.
HIGH PRESSURE ROTARY SEAL
Eliminates pressure bleed back, keeps pump efficiency high.
PRESSURE-BALANCED WEAR PLATES
Balanced, hydraulic forces on both sides of the plates accurately maintain fixed clearances between the plates and the gear faces . . . high volumetric efficiencies are assured at all pressures and power-robbing, frictional contacts eliminated.

APPLICATIONS

EARTH MOVING EQUIPMENT
CONSTRUCTION MACHINERY
MATERIALS HANDLING EQUIPMENT
AGRICULTURAL MACHINERY
MOBILE and GENERAL
INDUSTRIAL EQUIPMENT

Member NFPA

The basic design of HYDRECO Fluid Power Pumps has been proven in thousands of successful installations . . . on Earth Moving, Materials Handling and Agricultural equipment . . . where dependability, efficiency and ruggedness are of prime consideration. *Now,* this famous design has been refined by improvements that give you this outstanding performance PLUS — *substantially extended service life — three times greater!* Translated in terms of dollars and cents, this greater service life adds value to the Pumps you buy and pays your customers extra dividends on their investment.

Check the features shown above . . . combined, they enable HYDRECO Series 3000K Pumps to set new standards in performance, efficiency and trouble-free service.

Write—

for performance and installation data on HYDRECO 3000K Series Fluid Power Pumps.

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THE NEW YORK AIR BRAKE COMPANY
KALAMAZOO • MICHIGAN

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Kalamazoo, Mich.

Please send me complete information on HYDRECO Series 3000K Pumps.

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Lowers original equipment costs!
Lowers selling price of truck!
Lowers fuel, maintenance and replacement costs per truck mile!

Lipe DIRECT PRESSURE CLUTCH

Vital component in today's most economical system of power transmission, the Lipe DPB Heavy-Duty Clutch costs less at the start . . . materially reduces the competitive selling price of the vehicle . . . and affords substantial savings in over-all truck-operating costs per mile.

Other elements of the power-train contribute to these savings, but the Lipe DPB Heavy-Duty Clutch absorbs the greatest shocks and fiercest friction, dissipates the most heat, and by its simplicity, direct drive, easy adjustment and replacement-exchange, keeps the vehicle rolling with less cost for fuel, brake relining, oil replenishment and repair. Its worth in highway safety and preventative brake maintenance alone places it far in advance of costlier and more complicated drive components.

Advanced thermodynamic design and positive air circulation add up to a heavy-duty clutch of uncomplicated design with few moving parts. In short, it's a clutch with a low maintenance cost that matches both its low first cost and greatly lower truck-mile costs of operation.

● Lipe DPB clutches now available in 12", 13", 14", 15" single and two plate models. Write for engineering data sheets on the sizes which interest you.

LIPE ROLLWAY

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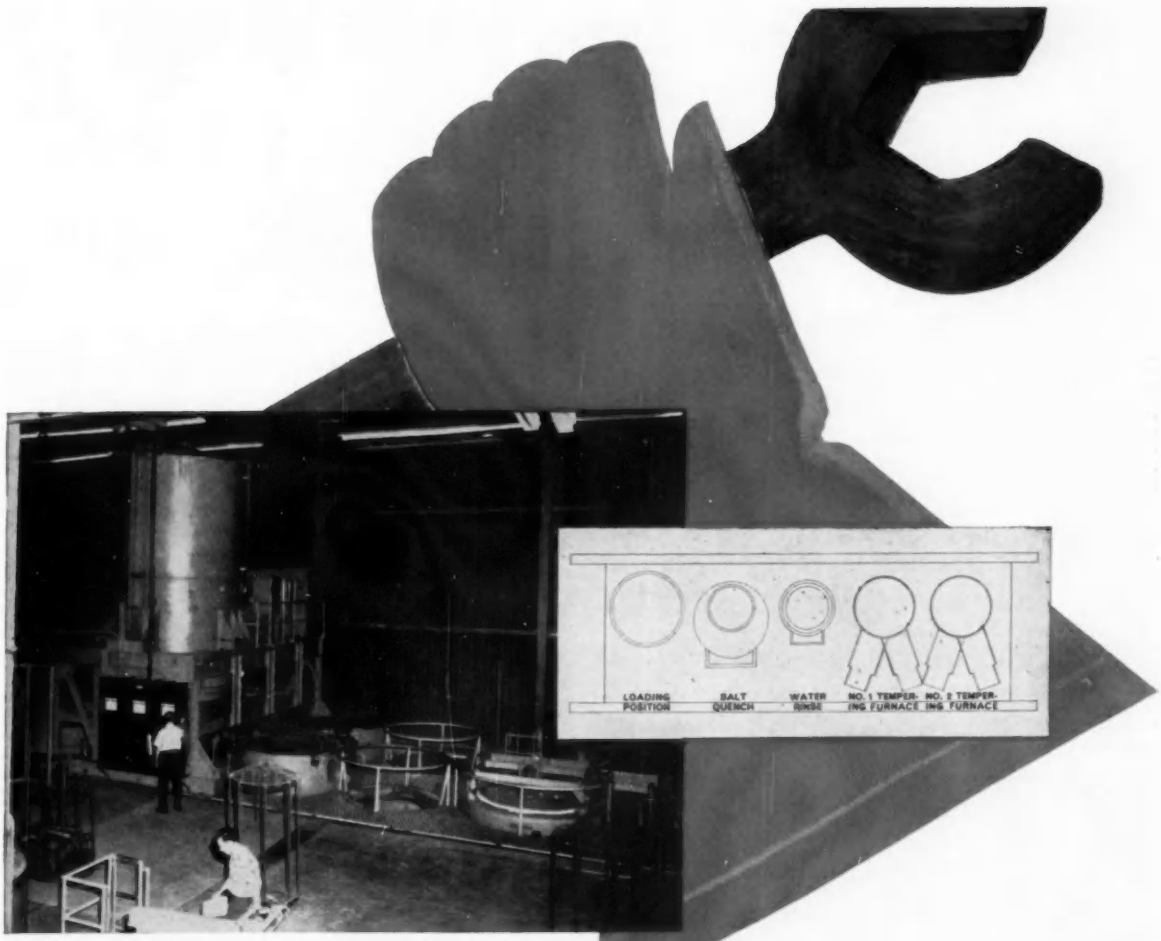
MANUFACTURERS OF AUTOMATIC CLUTCHES AND MACHINE TOOLS



Lindberg applies the creative touch to field-installation

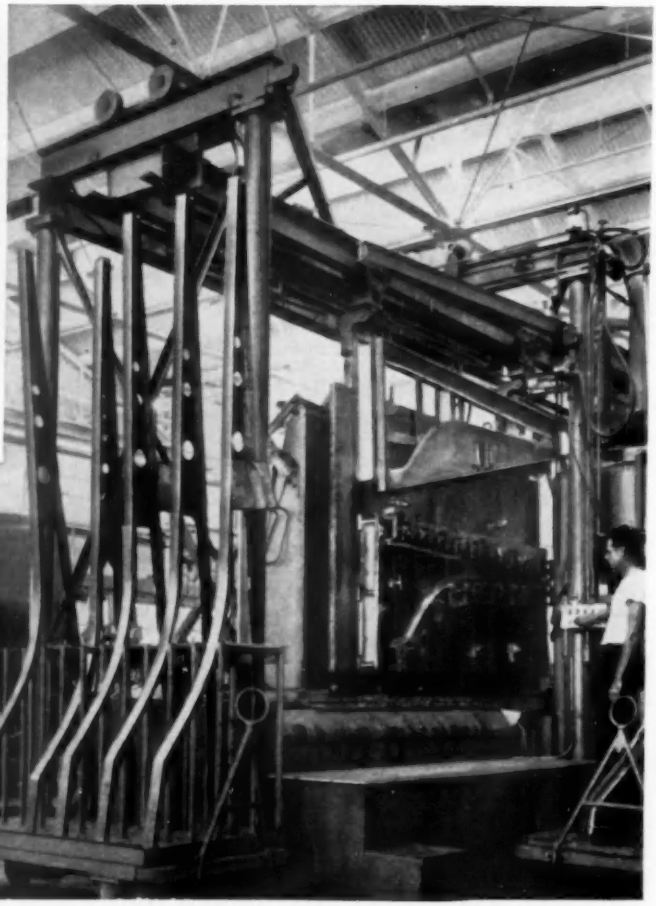
Here is an example of Lindberg's creative touch in field-installed heat treating equipment. Our unique design of this movable overhead furnace saved space, labor and time and increased quality and operating efficiency in missile manufacturing. We have the technical staff and the experienced engineers to design and install for you any requirement you may have for the application of heat to industry. Our service covers all types of heat treating furnaces, aluminum melting and holding furnaces, high frequency units, ceramic kilns, controls and all facilities required to fit this equipment into your production processes. We specialize in "turn-key" operations covering everything from design and engineering to the finished job installed in your own plant. Whatever your industrial heating problem, a good way to solve it is to talk it over with Lindberg. Just get in touch with your local Lindberg Field Representative (See classified phone book) or write Lindberg Industrial Corporation, 2321 West Hubbard St., Chicago 12, Illinois. Los Angeles Plant: 11937 S. Regentview Avenue, at Downey, California.

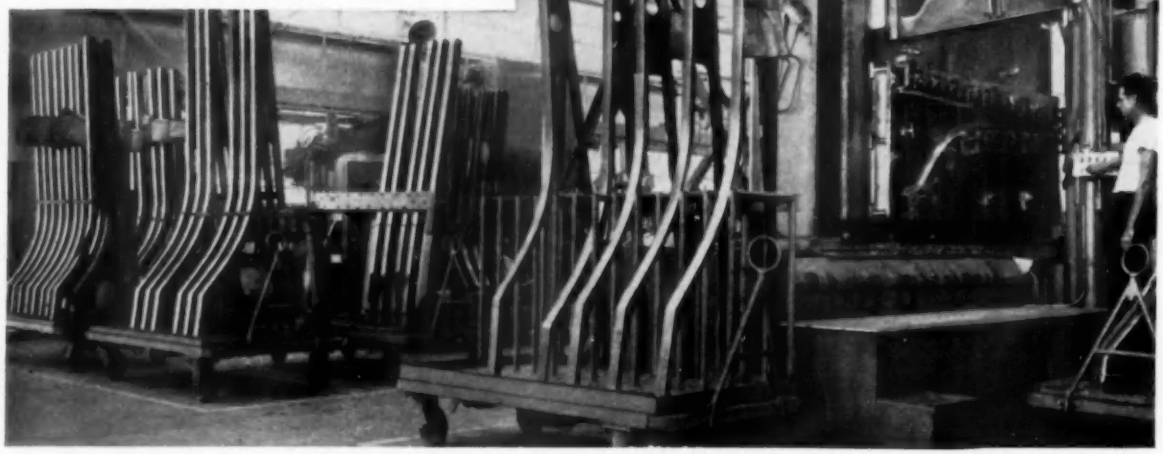
LINDBERG **heat for industry**

Problem-Solving Products from Republic

Increase Strength/Weight Ratios, Cut Costs, Save Weight, Maintain Dimensional Stability

Part of Rohr Aircraft's heat treating facilities where alloy steel flap tracks are put through a four-step cycle: (1) austenitizing, (2) marquench, (3) oil quench, (4) hot water rinse. Sequence maintains required dimensional stability.





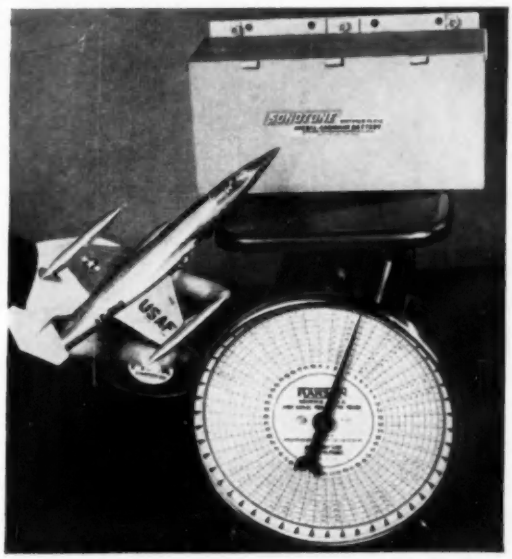
ALLOY STEEL MEETS HIGH STRENGTH, PRECISION REQUIREMENTS IN USAF BOMBERS. Steel weldments produced by Rohr Aircraft Corporation, Chula Vista, California, are an excellent example of the aircraft industry's constant effort to develop better and more economical methods of mass-producing large, high-strength structural aircraft components.

Rohr is currently using this weldment technique in manufacturing flap tracks for an Air Force bomber. The flap tracks are fabricated from AMS 6428 Alloy Steel, a type supplied by Republic. This fine steel provides a minimum tensile strength of 180,000 psi in the heat treated condition. Uniform response to heat treatment assures exceptionally good deep hardening characteristics—plus hard, wear-resistant surfaces.

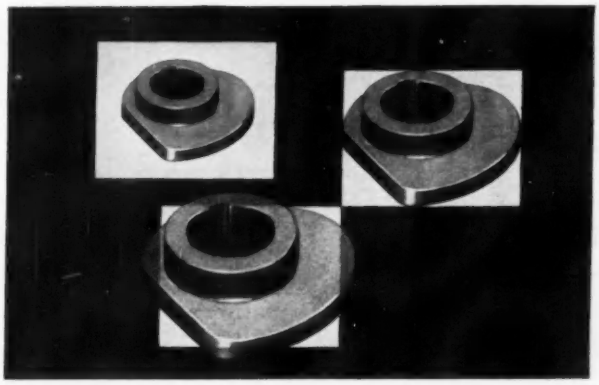
The exceptionally high strength-to-weight ratio of Republic Alloy Steel combined with the highest strength values permits the design of thinner, lighter track sections to save weight and hold down size without sacrifice of strength or safety.

Rohr's development of specialized tooling, welding, and heat treating techniques permits the production of these alloy steel weldments to close tolerances—a rigid aircraft engineering requirement. Costs are reduced by eliminating the need for expensive equipment and excess stock removal.

Specify Republic Alloy Steel for your parts that must be tough, strong, dependable. Our metallurgists are always available to help you in selection and processing. The coupon is your invitation to use this obligation-free service.



REPUBLIC STAINLESS STEEL, Type 302, cuts costs, saves weight, resists corrosion in jet aircraft storage battery cases made by Sonotone Corporation, Elmsford, New York. Stainless steel's exceptionally high strength-to-weight ratio and ability to withstand impact and vibration permits the use of a lighter gage, thus saving weight. Sonotone reports the metal's outstanding corrosion-resistance eliminates the need for painting the cases with no detrimental effect on service or appearance. Republic Stainless Steel also resists the wide extremes of temperature and atmosphere through which the batteries must operate. Mail the coupon for more facts on Republic ENDURO® Stainless Steel.



REPUBLIC IRON POWDERS with Controlled Dimensional Factor give your parts predictable dimensional characteristics after sintering. CDF means that in the presence of copper, Republic Iron Powder—depending on type—can be made to grow, shrink, or remain stable within acceptable tolerance limits. Tool engineers can design tools to part-print dimensions with the assurance that tolerances, transverse to the direction of pressing, can be held within ±.001 inches per inch. Fabricators can produce consistently uniform sinterings at faster rates and at minimum cost. Republic Booklet Adv-763 contains complete details. Send coupon for your copy.

REPUBLIC TITANIUM ALLOYS are used for weight saving and elevated temperature applications in the B-58 Hustler. The supersonic bomber is built for the Air Force by Convair, a division of General Dynamics Corporation, Fort Worth, Texas. These particular titanium alloys have minimum tensile strength of 130,000 psi and a minimum yield strength of 120,000 psi. Among the strongest alloys now being produced, they meet the demand for high strength to resist the effects of aerodynamic heating in supersonic aircraft, such as the B-58. Republic metallurgists and engineers, pioneers in the development of high strength-to-weight metals, are ready to help you apply titanium to your product or process.

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World's Widest Range of Standard Steels and Steel Products

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Have a metallurgist call.
☐ Alloy ☐ Stainless Steel
☐ Iron Powder ☐ Titanium

Send more information on these Republic products:
☐ Alloy Steel ☐ Stainless Steel
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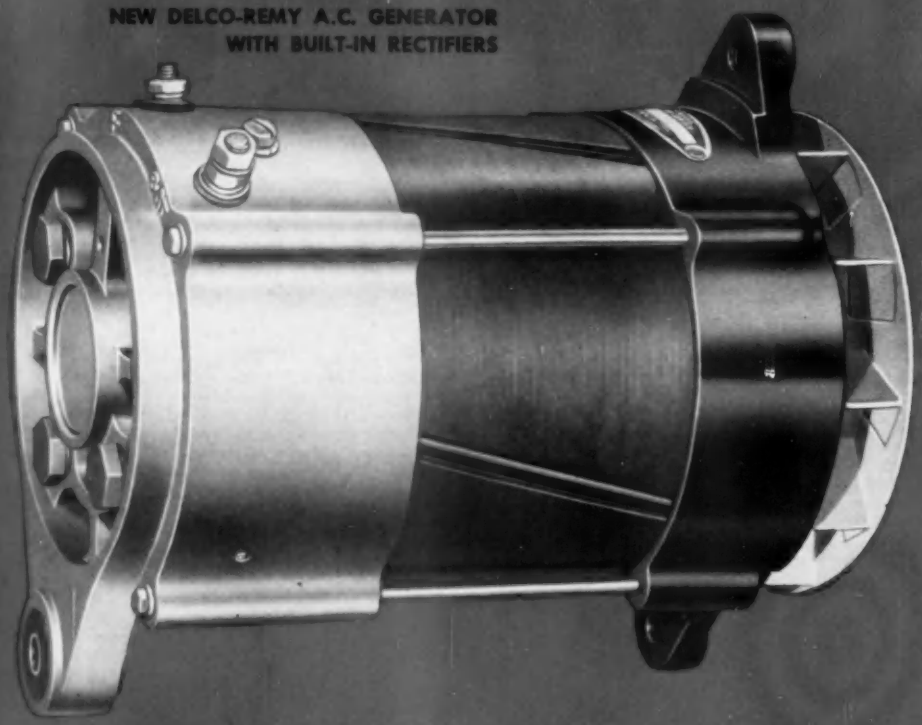
ANNOUNCING A MILESTONE

NEW DELCO-REMY A.C. GENERATOR
WITH BUILT-IN RECTIFIERS



PROGRESSIVE ENGINEERING MAKES THE DIFFERENCE

NEW DELCO-REMY TRANSISTOR VOLTAGE REGULATOR WITH NO MOVING PARTS

IN AUTOMOTIVE ELECTRICITY

—DELCO-REMY'S

NEW GOLDEN MILESTONE SELF-RECTIFYING A.C. GENERATOR WITH TRANSISTOR REGULATOR

Progressive engineering at Delco-Remy has produced the most significant development in automotive electricity in two decades—the revolutionary new *golden milestone* self-rectifying a.c. generator and its companion all-new transistor regulator. This trend-setting new power team is designed specifically to meet the extra output requirements of *future* cars and trucks—beginning with 1959 models.

The compact new generator with its specially developed built-in silicon rectifiers can be installed quickly and easily with a minimum of change in standard d.c. electrical systems . . . offers a heavy charge at engine idle and up to *twice* the total output—with only a small increase in weight.

Delco-Remy's unique transistor regulator represents a bold new concept in voltage regulation—an electronic unit composed of durable long-lasting transistors and diodes *with no moving parts.* There are no mechanical components such as springs, hinges and contacts, so mounting position and vibration have no effect on operation, and the usual adverse effects of temperature and humidity are nullified. To the user, this means long-lasting settings, more accurate control of generator voltage, and elimination of periodic maintenance.

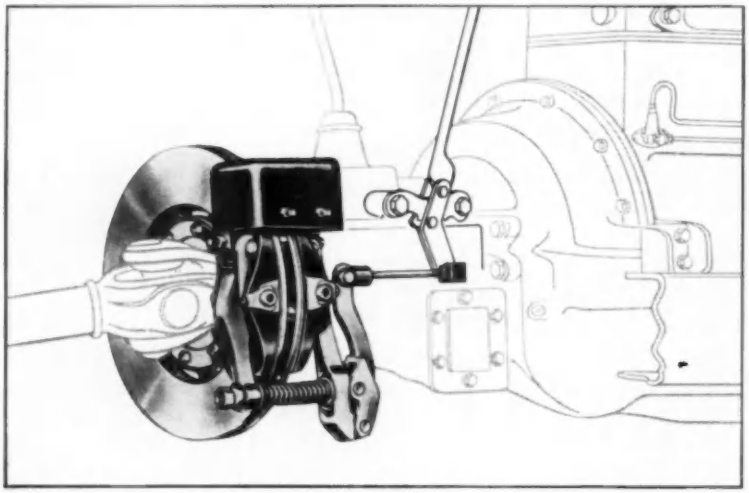
The Golden Milestone Power Team is an outstanding example of Delco-Remy engineering leadership in the automotive electrical field—of Progressive Engineering at work for you.

GM GENERAL MOTORS

GENERAL MOTORS LEADS THE WAY—STARTING WITH Delco-Remy ELECTRICAL SYSTEMS

DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

Automotive Equipment is Easier to Sell when equipped with TRU-STOP heavy-duty Brakes



Positive Protection Against Runaway or Parking Accidents

TRU-STOP brakes operate directly on the drive shaft. This means that they are not only excellent parking brakes, but dependable emergency service brakes as well. There's no dangerous self-energizing. TRU-STOP brakes have the surplus capacity for repeated use as an auxiliary to service brakes.

100% Ventilation Minimizes Fading

Brake efficiency depends on ability to dissipate heat rapidly and so prevent fading. TRU-STOP brakes are 100% ventilated. Discs are exposed to air even while braking. The TRU-STOP ventilation system circulates air *between* the disc plates.

Longer Life with Uniform Brake Pressure

The discs of TRU-STOP brakes are squeezed between the flat surfaces of the shoes. The brake lever operates both the front and rear lever arms simultaneously, and pressure is exerted on the center of each shoe. This puts the entire lining surface in contact, provides for even wear. TRU-STOP brake linings are *easy* to replace.

FOR POSITIVE PROTECTION...

Specify* TRU-STOP BRAKES *on* ANY *Heavy-Duty Equipment that Requires Braking

***WRITE* for Catalogs DH-33 and DH-530**

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CALENDAR

OF COMING SHOWS AND MEETINGS

Joint Heat Transfer Conference of ASME-AIChE, Edgewater Beach Hotel, Chicago, Ill..Aug. 18-21

Western Electronics Show and Convention, Pan Pacific Auditorium, Los Angeles, Calif...Aug. 19-22

Society of British Aircraft Construction, flying display and exhibition, Royal Aircraft Establishment, Farnsborough, England .....Sept. 1-7

International Conference on Peaceful Uses of Atomic Energy, Geneva, Switzerland .....Sept. 1-13

American Petroleum Institute, Oil Information Committee, meeting, Hotel Statler, Boston, Mass. .....Sept. 3-5

International Conference on Air Pollution, sponsored by ASME, Hotel Statler, New York, N. Y. Sept. 4-5

International Aviation Show, Coliseum, New York, N. Y.....Sept. 6-14

SAE National Farm, Construction, and Industrial Machinery Meeting, Milwaukee Auditorium, Milwaukee, Wis. .....Sept. 8-11

First International Congress of Aeronautical Sciences, Palace Hotel, Madrid, Spain .....Sept. 8-13

Second International Congress on Air Pollution, sponsored by ASME, Hotel Statler, New York, N. Y. .....Sept. 9-10

National Petroleum Association, 56th annual meeting, Hotel Traymore, Atlantic City, N. J. Sept. 10-12

Process Industries Conference, sponsored by ASME, Hotel Statler, Buffalo, N. Y. ...Sept. 15-17

Instrument-Automation Conference, 13th annual meeting, sponsored by Instrument Society of America, Convention Hall, Philadelphia, Pa. .....Sept. 15-19

National Industrial Conference Board, annual marketing conference, Waldorf-Astoria Hotel, New York, N. Y. .....Sept. 17-19

Material Handling Institute, Inc., fall meeting, The Greenbrier, White Sulphur Springs, W. Va. Sept. 22-24

Standards Engineers Society, 7th annual meeting, Benjamin Franklin Hotel, Philadelphia, Pa. .....Sept. 22-24

Seventh Annual Conference on Industrial Electronics, Rackham Memorial Building, Detroit, Mich. .....Sept. 24-25

Pressed Metal Institute, annual meeting, The Cloisters, Sea Island, Ga. .....Sept. 28-Oct. 2

Fourth Joint Military-Industrial Packaging and Materials Handling Symposium, sponsored by Dept. of Navy, Washington, D. C. .....Sept. 29-Oct. 5

SAE National Aeronautic Meeting, Production Forum, and Aircraft Engineering Display, Ambassador Hotel, Los Angeles, Calif. Sept. 29-Oct. 3

ASTE Semi-Annual Meeting and Western Tool Show, Shrine Exposition Hall, Los Angeles, Calif. .....Sept. 29-Oct. 3

NATIONAL OIL SEAL LOGBOOK

Ask yourself these questions when specifying oil seals

SHAFT RPM, FPM, RUNOUT, ENDPLAY	Is seal rated at or above my anticipated operating extremes? ☐ YES ☐ NO
TEMPERATURE, LUBRICANT TYPES	Will heat or special-purpose lubricants attack my sealing lip compounds? ☐ YES ☐ NO
PRESENCE OF DIRT OR OTHER FOREIGN MATERIAL	Point often overlooked. If present, should I specify dual-lip sealing member? ☐ YES ☐ NO
COST RELATED TO SEAL DESIGN	Will a simpler, less expensive seal do as good a job as a more sophisticated unit? ☐ YES ☐ NO
NEW SEAL DESIGNS AND MATERIALS ON MARKET	Are there new high temperature, high speed compounds I should examine before specifying? ☐ YES ☐ NO
SPECIAL DESIGNS FOR SPECIAL PROBLEMS	Not all sealing jobs can be met with stock seals. Do I need a special factory design? ☐ YES ☐ NO
DELIVERY, REPUTATION FOR QUALITY	Is my resource noted for on-time delivery, uniform quality, and good follow-up service? ☐ YES ☐ NO

Don't specify "blind." Your National Oil Seal Engineer has up-to-date data on seals—old, new and under development. He understands current sealing parameters; what special designs can probably be developed. His frank, free counsel can't help but lead to better sealing, faster assembly, simpler servicing, faster delivery or lower cost.

Call him today. Number's in the Yellow Pages, under Oil Seals.

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Plants: Redwood City and Downey, California
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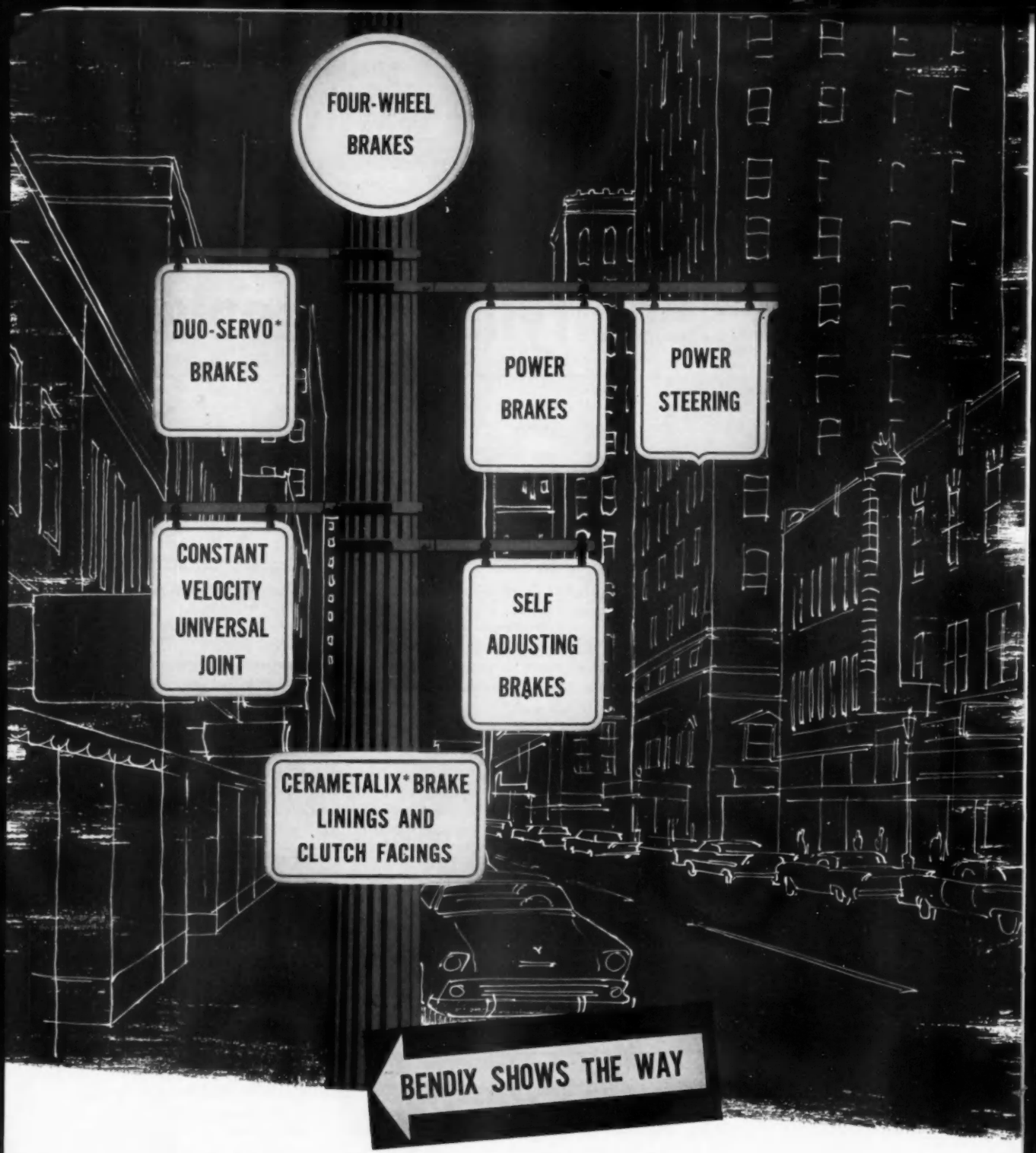

Each of these key Bendix developments has had an important influence on the course of automotive design. New Bendix developments now in process demonstrate continuing foresight into the needs of the automotive industry. Let us consult with you now on problems relating to your future.

*REG U.S. PAT. OFF.

Bendix PRODUCTS DIVISION South Bend, IND.

Bendix AVIATION CORPORATION

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High Spots of This Issue

▼ Automatic Control of Bodies at Fisher Plant

A big problem at all large body plants is scheduling the distribution of body styles to meet daily shipping requirements. How Fisher Body engineers are using automatic controls at Fisher Body Plant 1 marshalling yard to provide better work load distribution is told here. Page 48.

▼ Car Interiors Combine Beauty and Practicality

The growing influence of women has been largely responsible for current trends in automobile color and styling. This survey of 1958 passenger car interiors examines the use of monochromatic colors, non-geometric patterns, and novel textures as merchandising aids. Page 50.

▼ How Ford Makes Steering Gear Components

Ford Motor Co.'s Indianapolis, Ind., plant was built to produce steering units for the Ford line. This description of the plant covers all the major operations, including the conveyorizing and materials handling system. Page 56.

▼ Trends in Polish Vehicle Industry

The Polish vehicle industry got its start after the last war as a key part of an overambitious industrialization program. In this article David Scott analyzes the progress made in a decade, and points out that industry production is still well under the planned capacity of existing plants. Page 58.

▼ Handling Connecting Rods

The production of connecting rods at the Forge Plant of Oldsmobile Div. is facilitated by special handling equipment. This article explains how changes made in the production setup have reduced manual handling and improved the overall operation. Page 60.

▼ 28 New Product Items And Other High Spots, Such As:

British-built Ford Diesel; Allison 250-hp turbine; Europe's 1959 models; titanium alloys; testing equipment at Janitrol plant; rocket engines (Part II); and industry statistics.

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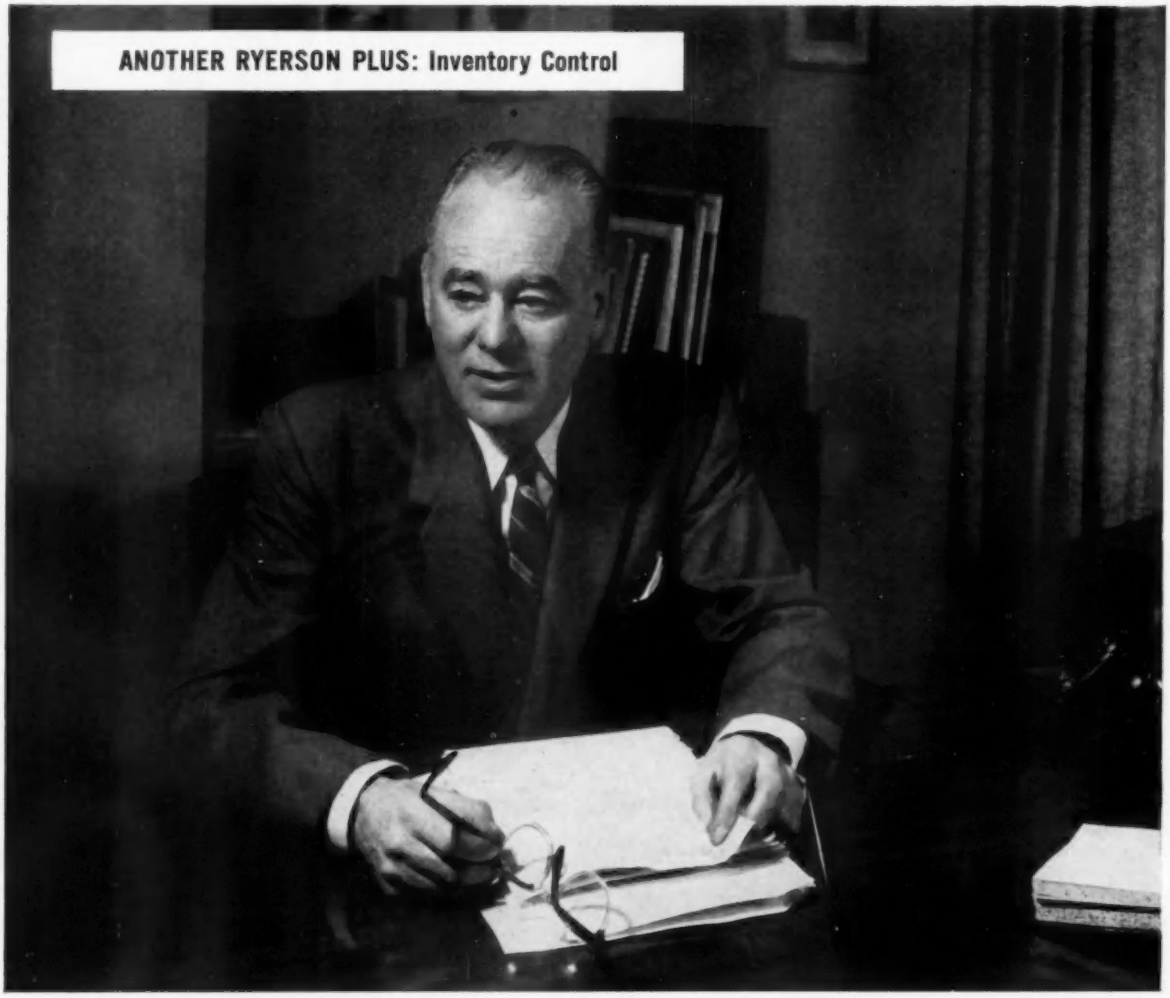

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News

OF THE AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 119, No. 4 **August 15, 1958**

Chrysler Plans for Small Car Despite Purchase of Simca Stock

Chrysler Corp. is proceeding with plans for an American-built small car of its own, despite the Aug. 1 announcement that the corporation is purchasing a stock interest in Simca of France.

Chrysler agreed to purchase for an estimated $5.4 million the interest now held by the Ford Motor Company in Simca, one of Europe's leading automotive concerns. This will give Chrysler approximately 16 or 17 per cent interest in the French company.

The American partner in this new agreement will not have a controlling interest in the French operation. But the bargain investment will give Chrysler an additional source of income and, more important, new breath for its gasping export business.

Under terms of the agreement, Chrysler will become sole distributor for Simca products in the United States and Canada. But this is only a "fringe benefit." Chrysler's foreign distributors and dealers will have access to the small Simca cars, and Simca's export organization will be able to sell the Chrysler products.

Chrysler's export business was once a profitable operation, but dollar and gasoline shortages, along with the physical growth of Chrysler's cars, have deflated the corporation's foreign business in recent years.

Chrysler president L. L. Colbert, in making the announcement of the Simca agreement, said the plan is "primarily for the purpose of combining the strong overseas organizations of Chrysler and Simca to create a new major force in the world automotive market."

He said that Chrysler is continuing its studies on a "North American type small car for possible production in our United States and Canadian plants to serve the North American Continent."

NEW MG SPORTS CAR HAS "TWIN CAM" ENGINE

This new MG sports car, a twin camshaft version of the popular-priced MGA, was introduced in New York City recently. The "Twin Cam" MGA is powered by a four-cylinder, 96.9 cu in. twin-overhead camshaft engine delivering 107 bhp at 6500 rpm. Engine bore is 2.96 in., stroke 3.5 in., and compression ratio 9.9 to 1. A streamlined and supercharged version of the "Twin Cam" was driven by Sterling Moss at over 245 mph on the Bonneville Salt Flats last year. Car will sell in the $3500 range, U.S. port of entry.

Chrysler already has the engine that may provide power to some future "North American type small car," if the corporation should decide to build one.

Several years ago Chrysler designed a four-cylinder engine for marine use, and by last year the engine was ready for production. Cost factors which would prohibit competitive pricing led the corporation to abandon the engine as a marine powerplant.

But the engine—block and all—still is available. Engineers have been working to adapt the small unit for automotive use, and reportedly have the package ready for production, with only minor tool changes needed.

In its original form, the engine developed 70 hp at 3400 rpm and had a displacement of 140-162 cu in.

Simca produced 172,000 vehicles last year, a big increase from the 42,000 built only six years previous. In the first quarter of 1958 production was 56,000 units, an increase of 15,000 over the same period a year ago.

Simca's passenger cars are the 4-cylinder, 96 in. wheelbase Aronde, the 4- and 8-cylinder Ariane, and the Vedette V-8 on a 106-in. wheelbase. The firm carries 54 models in its truck line and has a line of Diesel power agricultural equipment.

The main Simca plants are in Poissy and Nanterre, near Paris. The company also has interests in plants in North Africa, Brazil, and Argentina and distributor-operated plants in Sweden, Holland, Australia and the Union of South Africa. Distributors are located in 80 countries and major geographic areas.

In the U. S., Simca has some 600 dealers, nearly half of which are Chrysler Corporation dealers.

NEWS AUTOMOTIVE AND AVIATION

BRITISH UNVEIL BUILD-IT-YOURSELF CAR

A build-it-yourself car is to be introduced in Britain by York Noble Industries Ltd. Known as the Nobel 200, it will be available in two versions—a sedan (shown here) and a multi-purpose truck-convertible. The kit, which includes a Sachs 200 engine imported from Germany, is priced at about $498 for the sedan and $428 for the truck-convertible. Car can be built with either three or four wheels. Engine has a British rating of 10 hp.

Big Three's Financial Reports Reflect 1958 Drop in Sales

Recent six-month financial reports from the Big Three indicate how seriously the current recession has hit Detroit. All three car makers revealed that sales and earnings dropped sharply from the same period a year ago.

Ford's income dropped 97 per cent, GM's fell 31 per cent and Chrysler fell 128 per cent from the black into the red.

The reason is obvious: sales are not what they were a year ago. Ford sales were off 34 per cent, GM's off 13 per cent and Chrysler's down 48 per cent.

Ford, however, also cited the "increased costs of labor and materials" as a factor in the decline in earnings.

While losing money, Chrysler found one note of optimism in its report. The corporation did not lose as much money during the second quarter as it did in the first three months.

American Motors, meanwhile, issued a report covering nine months of its fiscal year. The company had a profit of $14.5 million for the period.

Here is a rundown on the financial statements:

CHRYSLER CORPORATION: Sales of $1075 million and a net loss of $25.2 million compared with a sales of $2061 million and earnings of $89.7 million a year ago. Second quarter operating loss was $15.1 million.

Defense business during the six-month period increased to $126 million, or 12 per cent of total sales, from $58 millon, or 3 per cent, a year ago. Unit shipments of vehicles down from 817,501 in 1957 to 374,222 this year. Retail sales up slightly during second quarter from first period.

FORD MOTOR COMPANY: Earnings in first six months of '58 total $5.4 million, compared with $171 million a year ago. Sales fell from $3009 million a year ago to $1987 this year. In the second quarter, a net loss of $17.3 million compared with earnings of $22.7 in the first three months. Sales fell during the second quarter from $1095 million to $891 million.

Unit shipments during the first six months totaled 710,471 cars and trucks, down from 1,195,592 a year ago. Retail sales, however, increased slightly during the second quarter, reducing dealer stocks by 27 per cent.

GENERAL MOTORS CORPORATION: Earned $334 million in the first six months, down from last year's $481 million. Second quarter earnings were $149 million, compared with $220 million a year ago.

Six-month sales fell from $5614 million a year ago to $4880 million this year. Domestic sales of GM cars and trucks totaled 1,416,319 units, down some 350,000 from 1957. Second quarter sales totaled $2400 million, compared with $2837 million a year ago. Defense Business dropped off from $300 million a year ago to $241 million this year.

AMERICAN MOTORS CORPORATION: A nine-month report. Earnings totaled $14.5 million, compared with a loss of $6.4 million during the same period a year ago. Sales totaled $358.5 million this year, $291.8 million in 1957. AMC opened its fiscal year last Oct. 1 with tax credits amounting to $47 million, so the earnings do not have federal tax applied.

AMC paid off the last of its bank loans, amounting to $5 million, on July 11. Still owes $14.5 million to an insurance company on long-term loan.

COMPANY REPORTS:

Reynolds Sales, Earnings Higher in 1st-Half of '58

Reynolds Metals Co. sales and earnings for the first half were higher than for the same period in 1957, Richard S. Reynolds, Jr., president, reported. Net amounted to $19,210,266, or $1.67 a share, compared with $18,546,817, or $1.61 a share, in the first half of 1957. Sales rose to $222,608,812 from $216,921,613. For the second quarter net earnings were $9,299,921, or 81 cents a share, against $8,666,246, or 75 cents a share in the year-ago period.

White Motor Co. reports sales for the first half were the highest for any similar period in company history. Sales totaled $125,211,443, an increase of 14 per cent over the first half of 1957. Net income declined to $2,543,208 from $3,350,746 a year ago.

Westinghouse Electric Corp. reports for the first half of 1958 net income of $29,973,000, or $1.70 a share, compared with $30,615,000, or $1.77 a share, in the 1957 period. Sales declined 6 per cent from the first half of 1957, to $823,961,000 from $982,939,000.

Allis-Chalmers Mfg. Co. reports for the first half sales of $269,506,611, compared with $286 million in the 1957 period. Net income was $8,611,204, or $1.02 a share, compared with $11,292,018 for the same period last year.

General Electric Co. reports net income for the first half totaled $103,381,000, or $1.18 a share, down 19 per cent from the same period in 1957. Sales declined to $1,978,994,000 from last year's record high of $2,121,310,000.

United States Rubber Co. reports net earning for the first six months of 1958 amounted to $8,696,611, or $1.06 a share, compared with $18,-

140,234, or $2.71 a share in the same period of 1957. Net sales amounted to $403,100,995, compared with $451,298,696 in the same period last year.

Lockheed Aircraft Corp. reports the highest first-half volume in history and a 29 per cent increase in net earnings for the six months ended June 29. Earnings rose to $9,743,000 from $7,570,000 in the first half of 1957. Sales of $465,735,000 were up almost 10 per cent from the $425,067,000 total registered in the first half of 1957.

North American Aviation, Inc., reports net income of $18,223,000 for the nine month period ended June 30, or $2.27 a share, compared with $26,604,000, or $3.32 a share for the same period last year. Sales amounted to $678,879,646, compared with sales total of $937,095,267 a year ago.

Douglas Aircraft Co. reports sales of $593,974,000 and net earnings of $12,645,000 for the first half ended May 31, compared with $565,580,000 in sales and net earnings of $16,674,000 for the first six months of 1957. Current earnings were equal to $3.41 a share, compared with $4.50 a share for the like period a year ago.

Bell Aircraft Corp. reports sales for the first half declined to $100,757,151 against $103,349,885 last year. Earnings rose to $2,175,703, or 81 cents a share, from 1957 earnings of $2,121,645, or 79 cents a share.

Ford Div. Chief Lifts Veil On '59 Price, Style Trends

Ford Div. general manager J. O. Wright, in a recent speech, lifted the veil on 1959 models slightly and hinted at possible trends in prices, styles and general conditions.

Wright indicated that prices will reflect higher costs of labor and materials in 1959, although there is presently an "economy race" going on within the industry.

In styling, the future will bring a wider selection, so that the public will have a "clear-cut choice." In speaking of the Ford car specifically, he said, "every piece of sheet metal is different" with crisp, integrated appearance, formal lines, flat roof.

Ford is offering a new hardtop model in its regular line with a flat roof that resembles the Thunderbird.

In referring to economy, Wright said that the "race" within the industry is an effort to give customers better economy than ever before. He made a reference to Ford's new engine and transmission.

Ford is offering a low-priced two-speed automatic transmission designed to compete with the lowest price automatic offered by Chevrolet.

Wright touched on a favorite subject in the automobile industry, the small car. He said that Ford research indicates that if it does become economically feasible to build a "lighter or smaller" car in Detroit, it should "not follow the European pattern."

MERCEDES-BENZ 300-SL HAS DETACHABLE HARDTOP

Detachable hardtop for Mercedes-Benz 300-SL, to be introduced this fall, is interchangeable with the standard folding hood and features a large wraparound rear window. Low-slung roadster is powered by a 183-cu in. six-cylinder engine with fuel injection that puts out 250-hp at 6200 rpm.

Buick Boss Predicts Sales Will Top 5,250,000 in '59

Buick general manager Edward T. Ragsdale predicts a healthy fourth quarter for the automobile industry and sales of between 5.25 and 5.5 million passenger cars in the domestic market during 1959.

Ragsdale, in showing the 1959 Buick line to the nation's automotive press corps, expressed optimism in the future of Buick and the industry as a whole. He has his sights set on fourth place in the industry during the coming year.

To capture fourth spot, Buick will be using a completely restyled and different car. Buick has done away with the Century, Super, Roadmaster, Special and Limited appelations. In their places are the LaSabre, Invicta and Electra. The Electra 225 will be the top model in the line.

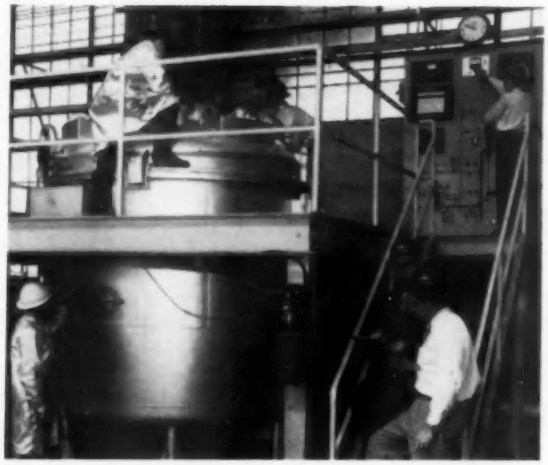
The '59 Buick will go on sale Sept. 19. Production will begin Aug. 18, with initial schedules of 1500 cars a day. The division will recall 5000 workers within the next 60 days, Ragsdale said, boosting total employment to 18,000 by Oct. 1.

Ragsdale said that Buick has scrapped everything and started out with a clean slate with its '59 models. The only item that bears even a faint resemblance to last year's car, he said, is the grille, "and even that has been changed radically."

DAIMLER MAJESTIC HAS DISK BRAKES ON ALL WHEELS

Daimler Majestic is the first British production sedan available with disk brakes on all wheels. The 231.4-cu in. six-cylinder engine fitted with twin S.U. carburetors develops 147 hp at 4400 rpm. It drives through a Borg-Warner automatic transmission that incorporates a holding lock on the intermediate gear. This luxury model has overall length of 196 in., is 73¼ in. wide, and 62¾ in. high.

NEWS AUTOMOTIVE AND AVIATION



PURIFYING "HOT" METAL

Effect of vacuum degassing technique in removing impurities in molten metal is examined at the new $750,000 Foundry Dept. & Applied Research and Development Laboratory of General Electric Co. It is just one of the pieces of apparatus employed to determine more efficient methods of foundry technology.

The Buick chief does not envision the demise of the medium price car market but, on the contrary, he believes the field will regain its former strength when the public has regained its buying confidence.

"As long as a man takes pride in his possessions, there will always be people who will want bigger and more luxurious cars," he said, adding that the 1959 Buick models will be roomier and more luxurious.

While 60 per cent of the customers bought low-priced cars in 1958, he said, half of these people paid the price of a medium price car. This, Ragsdale indicated, points to the actual strength of the medium-price market.

Ragsdale pointed out that this does not mean there is no market for small cars in this country (Buick sells GM's German-made Opel, a small car). There is a "fairly good" market for small cars, he said, "but the big market is for a safe, comfortable and roomy car."

Ragsdale said Buick deliberately planned an early phase out of production so that dealers could clean out 1958 models before the new series is introduced in September. He said some dealers will sell out two or three weeks ahead of new car announcement time.

Coated Mufflers Will Appear On More 1959 Automobiles

Coated mufflers — galvanized or aluminized — will appear on several automobile makes during 1959, with at least one car offering an all-aluminized steel muffler.

Two automotive suppliers, pointing to the life expectancy tests they have conducted on coated and uncoated mufflers and tailpipes, will be producing various types of coated mufflers for Ford Motor Company and Chrysler Corp. cars.

Armco Steel Corp., currently the only supplier of aluminized steel mufflers, will have its capacity taxed in 1959 because of a sudden acceptance of the technique.

Armco reports that the average life of cold rolled steel mufflers tested was 29.3 mos., while the average life of aluminized steel mufflers was between 42 and 58 mos. Maremount Automotive Products compared its galvanized steel mufflers with uncoated mufflers in laboratory tests, found the galvanized life was about double that of the uncoated steel mufflers.

Dodge is expected to offer all-aluminized mufflers in '59; other Chrysler Corp. and Ford Motor Company cars will offer mufflers with aluminized inside coating and galvanized outsides. Buick and Pontiac already are offering mufflers and tailpipes with at least some parts of aluminized steel.

According to one estimate, an aluminized steel muffler will cost about 60 cents more than an uncoated cold rolled steel muffler in a volume production car.

Car Consumer Reluctance Is Waning, Survey Shows

A University of Michigan Survey Research Center study shows that consumer reluctance towards automobile purchasing is waning. The center's report reveals a decline in intent to buy in the first two months of the year, but no further decline between February and June—in fact, possibly even a small increase.

The number of persons interviewed who anticipate an improvement in general business conditions within the next year doubled from 16 per cent to 32 per cent between February and June, the report shows. Another indicator of confidence was the slight increase in the percentage of persons who expect their personal finances to be in better shape.

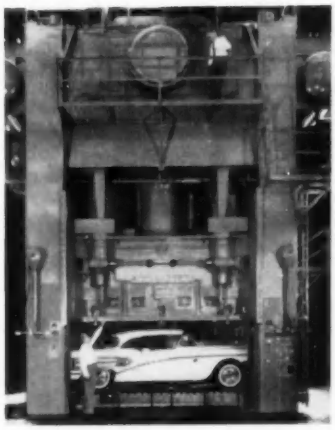
AMC Is Building Pilot Models Of Mighty Mite in Hudson Plant

American Motors already is building pilot models of the "Mighty Mite" military vehicle in the old Hudson Motor Car Co. Vernor plant on Detroit's east side.

AMC announced in late July that Kelvinator compressor production at the corporation's Plymouth Rd. plant in Detroit will be moved to Grand

ALUMINUM TRAILER CARRIES 50,000 LB PAYLOAD

This flatbead trailer constructed of high-strength Alcoa aluminum aircraft alloys weighs only 7400 lb and can transport 50,000 lb of concentrated payload. Built by Williamsen Body and Equipment Co., Ogden, Utah, in cooperation with the Aluminum Co. of America's development division, the trailer features aluminum in the flooring, fifth wheel plate, and eight forged disc wheels. Two D-8 Caterpillar tractors, each weighing 21 tons, are easily supported by the aluminum structural members.



BIG PRESS CRADLES CAR

This gigantic press installed at Buick is big enough to cradle a complete car in its 75-ton die bed. Weighing nearly 700,000 lb and capable of exerting 800 tons of pressure, the press will be used to form hoods. Standing 46 ft high, it consumes 20 tons of steel an hour when operating at capacity.

Rapids before the end of the year. The announcement renewed earlier reports that the light-weight military vehicle would be built at the compressor plant.

Current plans, however, call for building the entire 250-unit contract of Mighty Mites at the Vernor plant, and using the compressor plant for warehousing, offices, engineering and research.

The corporation's general offices are located in the Plymouth Rd. building.

Chrysler Plans To Put More Emphasis on Quality Control

Chrysler Corp. has taken steps to improve product quality control in the coming model year. Separate quality control offices have been set up for the company's manufacturing staff and for the Automotive Manufacturing Group.

C. G. Bauer has been named to the new post in the Automotive Manufacturing Group under L. I. Woolson, corporation vice-president and director of manufacturing services. J. J. Wetzel succeeds Bauer as director of the quality control office on the corporate level.

Other steps will be taken at the division level. Dodge, for instance, reports that the model changeover this month is emphasizing inspection and quality control.

Particular attention is being paid to final inspection and to inspection facilities for engines, power packages, air conditioning and "new safety devices," according to plant manager W. C. Cawthon.

AI TABLOID

A wind tunnel capable of producing velocities of Mach 14 and of simulating altitude above 250,000 ft has been built at the University of Southern California. In place of pumps, the tunnel is equipped with an extremely low temperature condenser, which is used to maintain a pressure difference across the supersonic nozzle in the tunnel.

* * *

Carborundum Co. will build new plant facilities in Niagara Falls for the manufacture of 4 in. to 14 in. grinding wheels. The new plant, which will cost about $6 million, will feature specially designed automatic and semi-automatic equipment.

* * *

Du Pont's Elastomers Laboratory developed a new process for continuous vulcanization of neoprene extrusions, which cuts down the curing time from about 30 minutes to 30 seconds and eliminates a great deal of handling. Uncured strip or tubing from the extruder passes through a trough containing a liquid curing medium and, as it emerges from the tank, is inspected and wound on a spool for shipment.

* * *

Ross Gear and Tool Co., Inc., acquired from Uni-Tubes, Ltd. of London, England, manufacturing and sales rights for Kopex tubing in the U. S. and for most of Central and South America. Kopex tubing is a pliable tubing formed from a strip in a continuous process.

* * *

Beryllium Corp. opened the nation's first integrated privately owned plant for the fabrication of beryllium metal at Hazleton, Pa. Most of the output will be aimed at the nuclear market, but the plant will also produce experimental shapes for aircraft research and development.

* * *

A new forging technique known as Rotary Forging is now in use at the Metals Processing Div. of Curtiss-Wright Corp. The Rotary Forge consists of four die-faced hammers which are used to forge a vertical, rotating billet of steel or other premium alloy into a final shape. The process will work hot or cold, using round, square, solid, or hollow billets.

Stewart Warner's South Wind Div. developed a new brazing technique called Alcres by which aluminum and steel as well as other high-temperature-resistant metals can be fabricated into composite structures. Company says the Alcres bond is gas-and-liquid tight; resistant to thermal shock from minus 320 F to more than 400 F; and is stronger in tension than parent aluminum.

* * *

Dayton Rubber Co. announced formation of a molded products division and development of a new type flexible radiator hose for cars and trucks. The division will market a wide range of natural and synthetic rubber industrial machine parts—from small bushings to gigantic rollers for steel mills.

* * *

AC Spark Plug Div. of General Motors will build an 11,500 sq ft building in Los Angeles to serve as West Coast engineering and sales headquarters for its commercial and defense products.

* * *

General Electric Co. has developed a new high-temperature alloy called Rene 41 which it says will make possible higher jet engine and airframe Mach numbers at lower specific weight. The new nickelbase, titanium-aluminum hardened alloy will be marketed by GE's Metallurgical Products Dept.

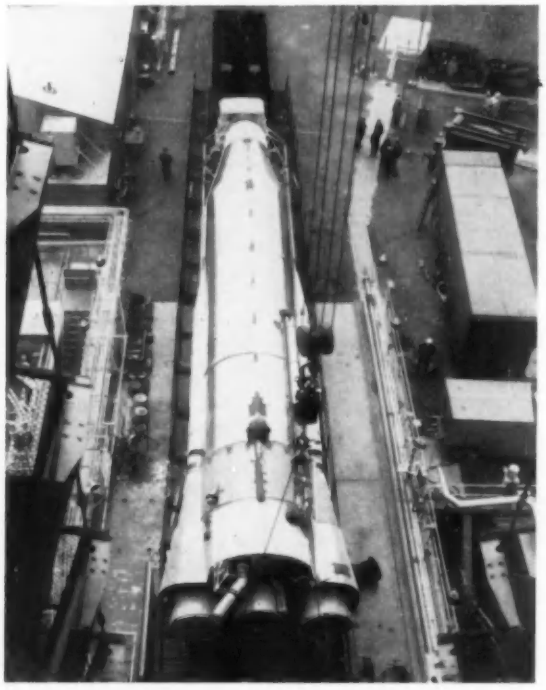
* * *

DeVilbiss Metal Fabricators Co., Detroit, a new wholly owned subsidiary of DeVilbiss Co., is offering manufacturing, engineering, sales and service for a complete finishing department or any of its components.

* * *

Writing in Planes, official publication of the Aircraft Industries Association, Dr. Theodore von Karman suggests the term "Aerothermochemistry" for a new branch of the aeronautical sciences, which involves the combining of aerodynamics with chemistry "for the solution of combustion problems especially in jet engines and rockets." Aerothermochemistry, he says, has become increasingly important because of the chemical changes—dissociation and recombination—occurring in flight at the frontiers of the atmosphere.

AVIATION MANUFACTURING



NEWEST ATLAS

An added third engine that will give the Atlas ICBM a range of more than 6000 miles is disclosed for the first time in this overhead view of the missile lying on its handling trailer. The third or "sustainer" engine is in the center of the thrust section; the booster engines on either side are the same as those that powered earlier Atlas flights. This unusual view was taken by a photographer high in the Atlas service tower at the Missile Static Test Site, Edwards Air Force Base, Calif., as the missile was being backed into position for erection in the tower. Angled pipe above sustainer engine is the turbopump exhaust.

Boeing President Proposes Renegotiation Act Amendment

The Renegotiation Act if continued in its present form will impede technological progress of the aircraft and missile industry, according to William M. Allen, president of Boeing Airplane Co.

Testifying before the House Ways and Means Committee, Mr. Allen proposed an amendment which would eliminate the inequities created by the Act and still provide controls over truly excessive profits. The House Committee is considering a two-year extension of the Renegotiation Act.

"Our direct experience with Renegotiation, and years of study of the problem, have led us to the conclusion that the objectives of Congress with regard to the encouragement of efficiency and the elimination of excessive profits, in which we fully concur, have not been achieved," he said.

Mr. Allen said renegotiation was conceived as a "watchdog" function to eliminate clearly unreasonable, excessive and unconscionable profits from defense contracting. "Contrary to Congress' desire," he stated, "the simple concept of Renegotiation has become a complex, arbitrary process, administered in such a way that efficiency and cost reduction by defense contractors is discouraged."

The aircraft company executive pointed out that the Defense Department has established a wide variety of contracts, including the incentive type, which permits contractors to share in savings realized by cost reduction or to be penalized if costs exceed estimates. Confiscation of earnings realized by efficiency removes the contractor's incentive to strive for the very cost reduction for which the procuring agency provided the incentive, he said.

Mr. Allen proposed an amendment to the Act which would recognize the validity of the earnings provided in the framework of the contract negotiated between the procuring agency and the contractor.

Rocketdyne to Develop Million-lb Thrust Engine

An Air Force contract to begin development work on a million-lb thrust has been awarded to Rocketdyne, a division of North American Aviation, Inc.

Simultaneously, the Air Force under separate contract extended Rocketdyne development of a previously undisclosed engine to provide thrust in the intermediate range between current propulsion systems and the huge million-pound engine. Work on this engine has been underway at the North American division since mid-1955.

Both engines are liquid propellant systems, similar in principle to Rocketdyne engines for the Atlas ICBM, the Thor and Jupiter IRBM's and the Redstone missile that provided the first-stage boost for the satellite launching Jupiter "C."

The two contracts were announced by S. K. Hoffman, a vice-president of North American Aviation, Inc., and general manager of Rocketdyne. Work under both, he said, would be carried out at the division's main plant in suburban Los Angeles.

GM, Callery, and Thiokol Form Missile and Space Travel Team

General Motors, Callery Chemical Co. and Thiokol Chemical Corp. have entered into a working agreement aimed at developing advanced devices in the field of guided missiles and space travel.

In a joint announcement the three firms said the agreement is limited to missiles and space research.

"Although we will pool our technology in a concentrated effort to advance overall astronautical development," the announcement said, "this new working arrangement in no way restricts individual research, sales or production programs of each company."

General Motors, through its Allison and AC Spark Plug divisions, will work on air breathing engines, guidance systems, missile components and structures.

Callery and Thiokol will provide propellant components for space vehicles.

Tilt-Wing VTOL Plane Makes Its First Successful Flight

The first tilt-wing VTOL (vertical take-off and landing) research aircraft—Vertol's Model 76 (Army VZ-2)—has successfully completed transition flights, Don R. Berlin, president of Vertol, announced.

The Model 76 is powered by a Lycoming T-53 gas turbine geared to two Vertol-designed, three-bladed rotor-propellers each with a diameter of 9½ feet. It has a wing-span of 24 feet 11 inches and a length of 26 feet 5 inches.

The straight wing in which the two-rotor-propellers are installed tilts to a vertical position for take-off, hovering and landing, and swings down to a horizontal position for in-flight cruising.

The plane also is equipped with two tail fans for control in the helicopter hovering condition, one installed horizontally to control pitch and one placed vertically to control yaw. The T-53 engine supplies power for the tail fans and for the rotor-propellers.

The Model 76 was developed under one of several contracts awarded by the Office of Naval Research and the U. S. Army in 1956 for vertical take-off and landing research aircraft.

Republic Aviation Announces $35 Million Research Program

Republic Aviation Corp. reported that it is embarking on a four-year $35-million program in advanced aircraft missile and space research.

The program will include construction of a $14-million Engineering Research and Development Center at the firm's main plant in Farmingdale, L. I.

The company said the program has these objectives: to develop new, sophisticated forms of aircraft, to develop new families of missiles and missile systems that are as yet uncharted, and to stimulate design of manned vehicles for space travel. A corollary of this intensive effort, the announcement said, would be the creation of "a host of new products and hardware" to support this technological advance.

Convair Gets $314 Million AF Award for Atlas ICBM

Convair (Astronautics) Div. of General Dynamics Corporation received an Air Force letter contract for $314,800,000 for past and present research, development and design of the Atlas intercontinental ballistic missile and supporting equipment.

The contract announcement was made by Major Gen. Ben I. Funk, ballistic missiles manager for the Air Materiel Command, at the dedication of the new $40-million Convair-Astronautics plant in San Diego, Calif. Cost of the plant and its equipment has been shared equally by the Air Force and General Dynamics Corporation.

FIRST PROTOTYPE OF BB-152 JET TRANSPORT COMPLETED

First prototype of East German BB-152 jet transport is now undergoing ground tests prior to its maiden flight. Modifications since plane was announced at Leipzig Fair in March (see AI, May 1, 1958) include landing gear with main bogie and nose wheel under the fuselage, and single stabilizing wheels retracting into wing-tip pods. Seating arrangements for 48, 57 and 72 passengers are planned. Four 6950-lb engines, hung in paired pods, power this medium-range aircraft.

The new contract is in the form of a supplemental agreement to the basic Atlas contract, General Funk said. It puts into formal form a previous letter contract and "represents a substantial effort on the part of Convair in the prosecution of the Atlas intercontinental ballistic missile program," General Funk said.

Cessna Plans Advance Model Single-Engine Plane for 1959

A new advanced single-engine airplane has been announced by Cessna Aircraft Co.

Del Roskam, vice-president and general manager of Cessna's commercial aircraft division, said the new airplane, designated the Model 210, will be available for the commercial market in late 1959.

Roskam said the new model will give Cessna an entry in the high-performance single-engine market between the Skylane and the 310B "with advanced design features."

Roskam pointed out the new Model 210 would incorporate design features not previously used on a commercial single-engine airplane. Cessna has been flying the new model for some time, but the company did not disclose any performance figures.

Allison Div. Gets Contract For 250-Hp Turbine Engine

The Air Force and the Army have awarded Allison Div. of General Motors a $3.2 million contract for the development of a 250-hp turbine engine for light planes and helicopters.

Allison's engine was chosen from a number of designs submitted by major engine manufacturers. It will be manufactured in two models—one a prop-jet or gas turbine weighing only 106 lb for propeller-driven light planes, the other a turbo-shaft engine weighing only 90 lb for use in helicopters.

The Model 250 incorporates a "free" turbine principle, the company explained. Air enters the compressor and is discharged through a diffuser. The compressed air then flows through two external ducts to the combustor chamber where fuel is injected and the mixture burned. Here, air flow is reversed and passed through a gas generator turbine and then on to the free power turbine. A shaft is connected to the free power turbine and, through a series of gears, transmits the power to the propeller shaft at the required speed in the case of the prop-jet, or to a power takeoff in the turbo-shaft version.

Ryan Gets Navy Contract For VTOL Jet Control System

Ryan Aeronautical Company is developing a jet reaction control system that will function efficiently with an afterburner in a tactical type vertical take-off and landing plane for the Navy.

The contract, from the Navy Bureau of Aeronautics, follows successful demonstration of VTOL principles in Ryan's experimental X-13 Vertijet.

First phase of the work aimed at developing a more advanced type of VTOL aircraft jet reaction control system for tactical operations has been started in Ryan's huge jet engine test cell, utilizing a General Electric J-79 engine.

MEN IN THE NEWS

Zollner Corp. — Robert B. Hawkins was elected vice-president—sales.

Northrop Aircraft, Inc.—**Robert R. Miller** and **Thomas V. Jones** were elected senior vice-presidents, and **Richard R. Nolan** and **Irving Roth** were made corporate vice-presidents.

Clark Equipment International, C. A.—**Walter E. Schirmer** was elected president and **Martin E. Graham** vice-president and general manager.

Chrysler Corp., General Sales Div.—**David R. Crandall** was appointed director of the marketing staff and **Lawrence E. Nelson** was made director of vehicle sales.

Dodge Div., Chrysler Corp. — O. F. Keeler has become manager — product planning analysis.

Carpenter Steel Co. — **James O. Peale** was appointed manager of distributor sales.

Crucible Steel Co. of America—**William R. Howell** has been named assistant to the vice-president-operations.

Dow Chemical Co., Midland Div.—**Theodore F. Throsberg** has been appointed manager of Analytical Laboratories.

Koehler Aircraft Products Co.—Richard M. Johnson was named president.

Chevrolet Motor Div., General Motors Corp.—V. R. Cramer has been named manager of dealer development activities and M. W. Worden succeeds him as head of the national business management department.

Ford Motor Co.—**John Dykstra** was elected a member of the board of directors and of the executive committee.

Allied Research Products, Inc.—**H. C. Irvin** was elected president and chairman of the board; **Jules Horelick**, vice-president; **Philip G. Richey**, vice-president and treasurer; **J. A. Cairns** and **F. M. Mansfield**, vice-presidents.

Clearing Machine Corp., Die Division — James L. Wheeler has been appointed general manager.

Hughes Aircraft Co.—**Murry S. Gelber** has been appointed treasurer.

Philco Corp.—**Saul Rosen** has been named to the newly created position of manager, programming research and development for "Transac" computers.

Sundstrand Machine Tool Co., Sundstrand Turbo Div.—**George F. Anisman** is now chief applications engineer.

Joseph T. Ryerson & Son, Inc. — Paul J. Fountain has been named manager of stainless steel sales.

Molded Fiber Glass Co. — Chester Ward has become vice-president and general manager.

Black & Decker Mfg. Co. — **Raymond G. Horner** has been appointed vice-president—marketing.

Electric Storage Battery Co., Exide Industrial Div.—**Robert J. Muth** was transferred to the Philadelphia headquarters as field sales manager.

Hydrodyne Corp.—**Donald Z. Erle** has become chief engineer of fluid control devices.

Lima Electric Motor Co.—**Wayne M. Gideon** was elected president.

Allis-Chalmers Mfg. Co. — **Charles W. Parker, Jr.**, was named director of sales promotion for the industries group.

Jefferson Chemical Co., Inc.—**John D. McPherson** was elected executive vice-president; **Donald L. Griswold**, vice-president for marketing; and **Lynn R. Strawn**, vice-president for manufacturing.

Jones & Laughlin Steel Corp., Traffic and Transportation Div.—**Edward H. Ashton** has been promoted to general supervisor of the Traffic Dept.

Simoniz Co.—**Paul J. Greenfield** was promoted to director of merchandising.

Philco Corp.—**John B. Hunt** has been named assistant general manager of the Government and Industrial Div.

R-N Corp.—**P. William Bakarian** has been appointed president and general manager; **John S. Breitenstein**, vice-president in charge of administration; and **Rollin P. Smith**, vice-president in charge of engineering.

United States Rubber Co. — **Leslie G. Wrigley** was named sales manager of automotive sales for the textile division and **Dr. Thomas L. Wilson** was appointed manager of the Research Center in Wayne, N. J.

Firestone Tire & Rubber Co.—George R. Thurman was made director of the Monterey, Calif., engineering laboratory of the guided missile division.

Chrysler Corp—**John J. DiCicco** was made director of pre-production planning and analysis for the newly created Production Programming and Traffic staff; **Paul G. Fritsching, Jr.**, director of traffic; **Richard J. Gleason**, administrative assistant to director of production programming and traffic; **Lester O. Houghton**, director of vehicle programming and reports; and **William J. Jones**, director of production control.

Erler Pattern & Model Corp.—**H. E. Murray** was appointed chief engineer of the plastics products division.

Dodge Div., Chrysler Corp. — **Charles B. Wickard** was promoted to distribution manager of the Dodge Plant.

Yale & Towne Mfg. Co., Yale Materials Handling Div. — **Edward A. Toomey** was named manager of the Forrest City, Ark., manufacturing plant.

Borg-Warner Industrial Cranes—**Neil C. Reed** has been appointed Eastern District Manager.

Dayton Rubber Co. — **William E. Wayland** was made operating manager of the Automotive Original Equipment Sales Div., with headquarters in Detroit.

Valvair Corp.—**Leonard L. Krause** was named controller.

Goodyear Tire & Rubber Co., Industrial Products Div.—**A. R. Hacker, A. B. Hirtreiter, F. O. Leonard, R. H. Miller,** and **E. C. Montgomery** were named chief engineers for prescribed areas of development work for the division.

Caldwell Mfg. Co.—**F. Dean Lowell** has been appointed assistant sales manager.

Standard Screw Co., Chicago Screw Co. Div.—Robert B. Noren has been promoted to sales manager, Special Products Div.

Tung-Sol Electric, Inc.—Jean E. Witbeck, vice-president in charge of lamp manufacture, has retired. Frank J. Ehringer has been named general manager of automotive products.

Babcock & Wilcox Co., Tubular Products Div.—**G. H. Weight** has been named sales manager—middle states; **J. H. Roach**, district sales manager of the Tulsa, Okla., office; and **W. C. Mohrman**, district sales manager of the Houston, Tex., office.

Electric Auto-Lite Co., Electrical Products Group—**A. N. Kaiser** has become chief engineer of the Syracuse Div. engineering facilities.

Minneapolis-Honeywell Regulator Co., Aeronautical Div.—Charles L. Davis and W. T. Noll have been named general manager and assistant general manager, respectively.

Sieberling Rubber Co.—**James P. Drury** was named manager of production analysis and control.

Engis Equipment Co., Hyprez Div. —**Robert E. Reid** was promoted to general manager, and **Walter B. Panko** was named national sales manager.

Dodge Div., Chrysler Corp.—**E. C. Shawe** has been appointed quality control manager, and **R. C. Kobus** and **C. E. Taylor** were promoted to Dodge manufacturing engineer and Dodge plant manager, respectively.

Babcock & Wilcox Co., Tubular Products Div.—Leon B. Wohlgemuth has been made general sales manager.

Kaiser Aluminum & Chemical Sales, Inc.—Vincent E. Flaherty is now automotive industry manager.

Consolidated Electrodynamics Corp., Datalab Div.—**Daniel E. Murphy** was appointed administrative manager.

Ling Electronics, Inc. — **Charles Theodore** was elected vice-president—sales.

Raytheon Mfg. Co.—**W. Raymond Burrows** was named director of the newly established Government Relations office at Rome, N. Y.

Lockheed Aircraft Corp., Missile Systems Div.—**Leslie D. Myers** has been made chief manufacturing engineer.

Standard Screw Co., Chicago Screw Co. Div.—**H. T. Thompson** has been promoted to sales manager, standard fastener products.

Eaton Mfg. Co., Axle Div.—**Orin G. Goodrich** has been appointed district sales manager in Fort Wayne, Ind.

Waldes Kohinoor, Inc., Truarc Retaining Rings Div., **Lewis Hammond** and **Gordon S. Metcalfe** have been appointed representatives in northern Illinois and northwestern Indiana.

Mack Trucks, Inc., Bus Div.—**Harold R. Fouss** was named sales manager.

Campbell Chain Co.—**Howard D. Campbell** has become vice-president in charge of manufacturing.

Borg-Warner Corp., Ingersoll Products Div.—**Blaz A. Lucas, Jr.**, has become manager of sales.

Necrology

Earle F. Johnston, 71, a director and former vice-president of General Motors Corp., died July 24, at Detroit, Mich.

Arthur W. Hughes, 67, vice-president and general manager of Cleco Pneumatic Tool Co. of Canada, died July 21, at Toronto, Ont.

Boyd C. Eberhard, 70, retired chief engineer in charge of tubes and accessories for Goodyear Tire & Rubber Co., died July 13, at Akron, O.

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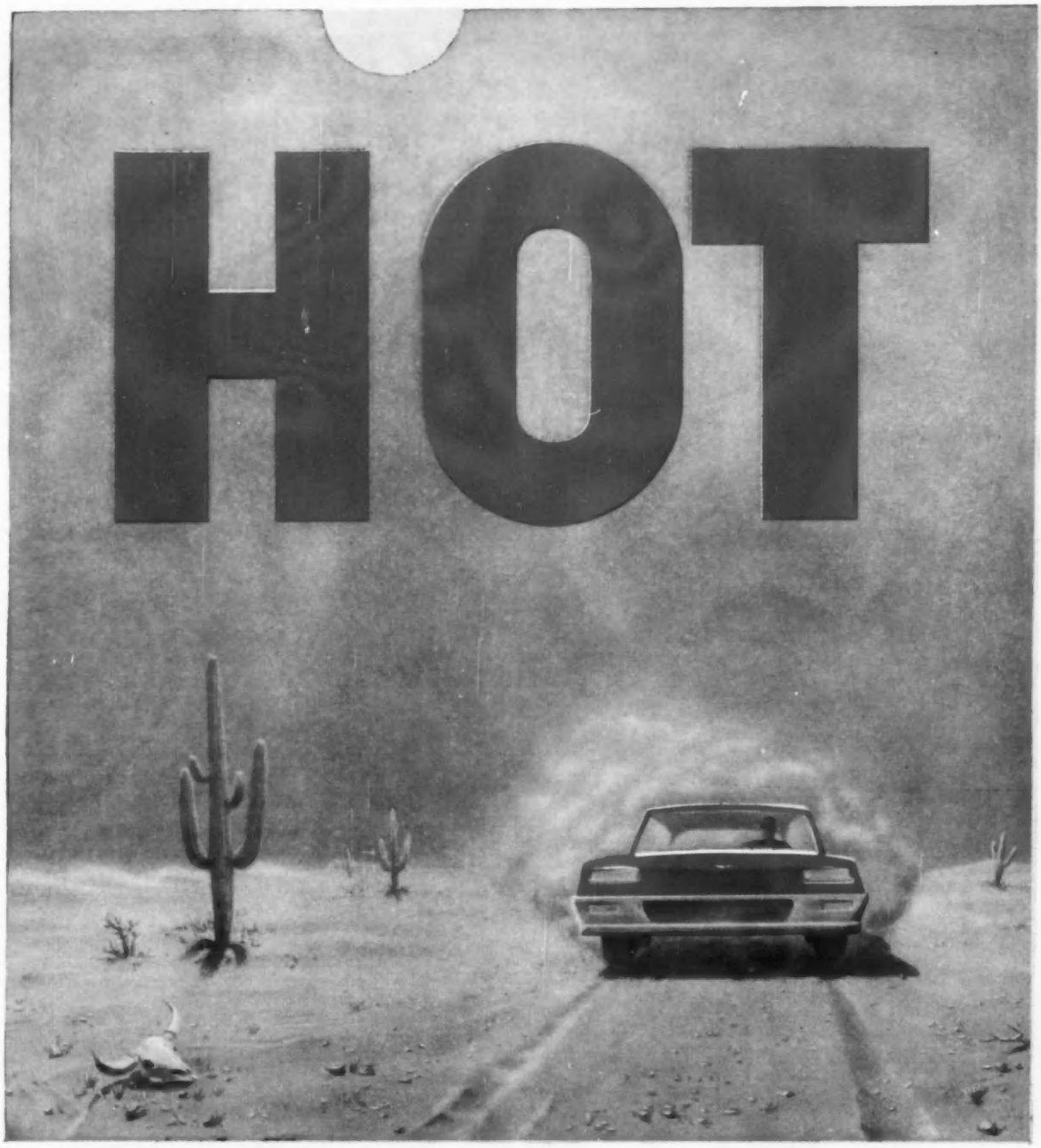

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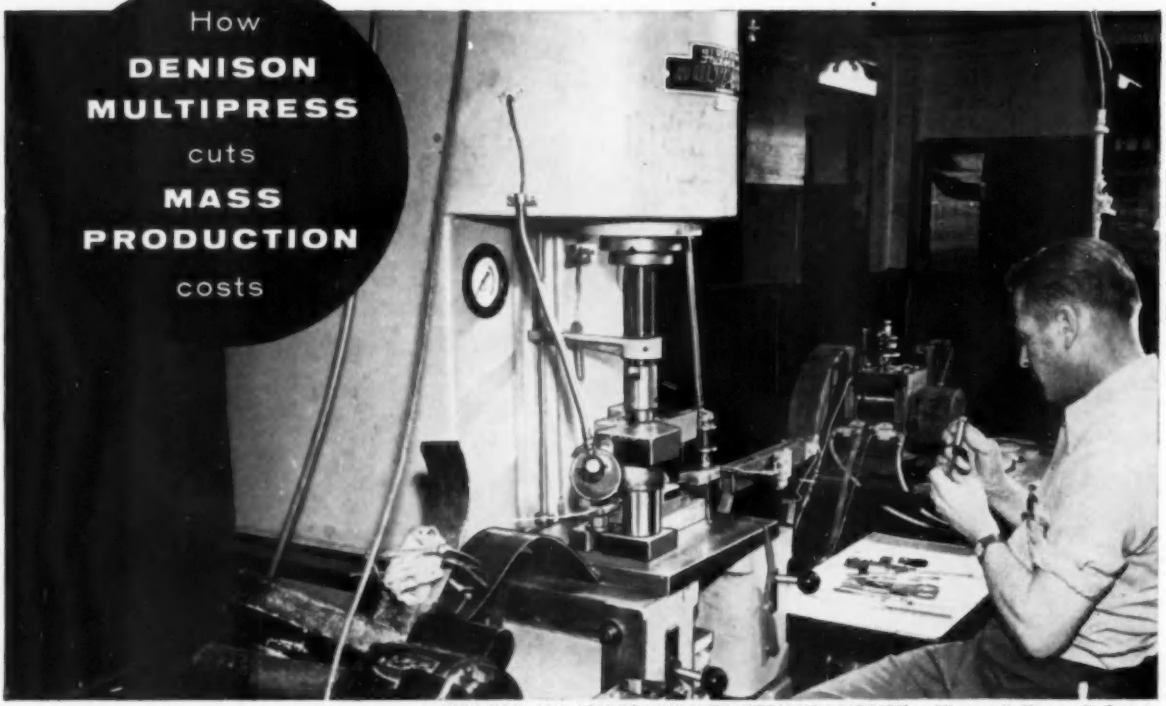
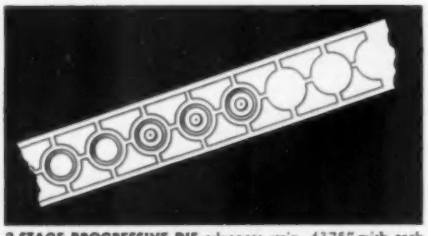
How **DENISON MULTIPRESS** cuts **MASS PRODUCTION** costs

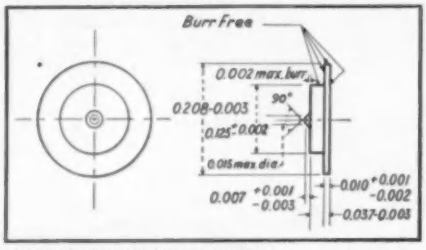


HIGH-SPEED LOW-COST COINING WITH HYDRAULIC MULTIPRESS at Minneapolis-Honeywell. Operating at 225 strokes-per-minutes, modified 8-ton Denison Multipress turns out 70,000 magnesium buttons a day. Automatic controls and safety limit switches permit one operator to handle 3 Multipress lines.

How **DENISON** *hydraulic* Multipress saves cash on high-speed coining for **MINNEAPOLIS-HONEYWELL**



3-STAGE PROGRESSIVE DIE advances strip .4375" with each ¾" Multipress ram stroke. Holes are used for piloting – and for stock advance with hitch feed.



EXTRUDED, COINED AND BLANKED from pure magnesium strip—this button is mass-produced at *extremely low cost* on Multipress. Stock sizing rolls control thickness of strip fed to die. *Denison hydraulic Multipress controlled pressure easily holds necessary precision tolerances.*

High-speed coining of small magnesium buttons is normally a mass production job for an automatic screw machine. *But, Minneapolis-Honeywell found it could do the job better and faster... save money, too... with Denison hydraulic Multipress.*

A modified 8-ton Multipress—equipped with 3-stage progressive die, 6-ton cylinder and special high-speed valves—mass produces about 70,000 of these ordnance-item buttons per 8-hour shift. Coining and blanking the buttons from coiled strip stock with Multipress – instead of using bar stock and a screw machine – *cut costs significantly on the operation.*

The progressive Multipress die—designed by Minneapolis-Honeywell engineers—has 3 working stations. *First station* pierces triangular holes which relieve strip and permit proper impact extrusion. *Second station* extrudes and coins parts to size – but leaves them intact in the strip. *Third station* blanks parts and moves them through the blanking die into waiting containers.

This is typical of hundreds of jobs that Denison Multipress does today throughout industry... to give users the *competitive edge.*

Denison hydraulic Multipress means important *plus benefits,* too – longer tool and die life... less scrap... better quality control... minimum maintenance... greater operator safety.

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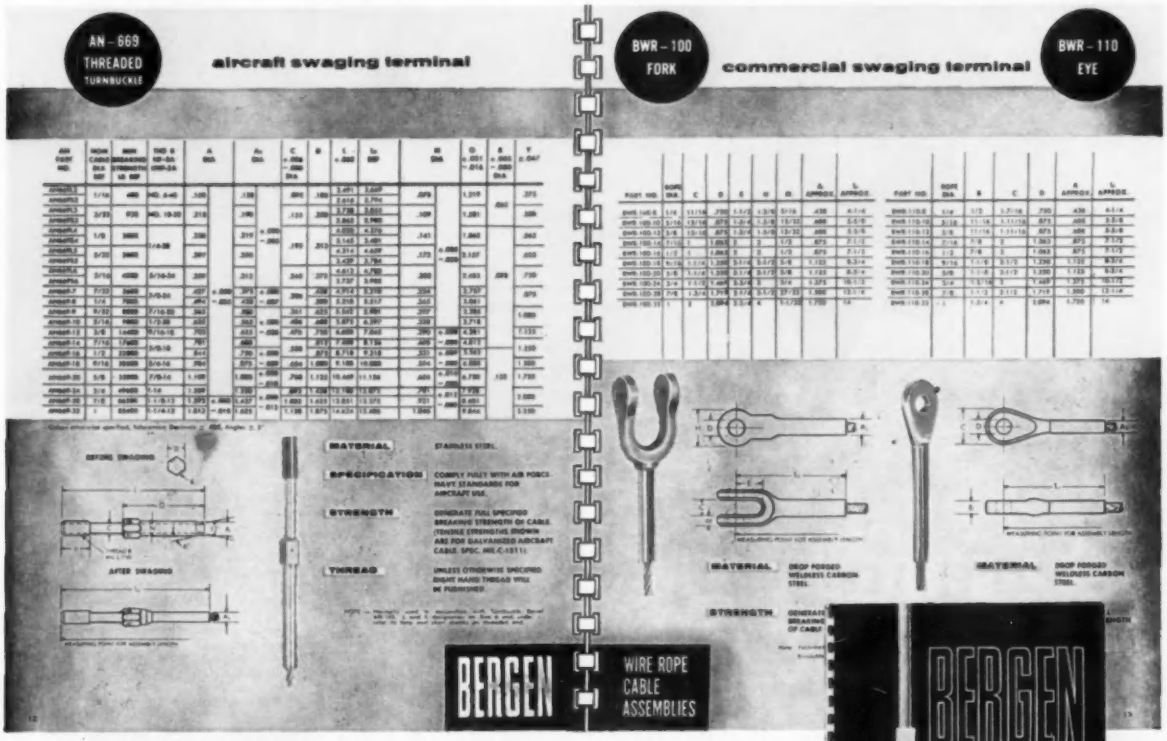

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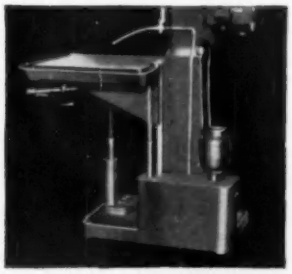

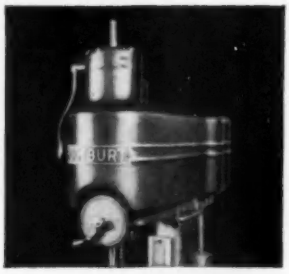

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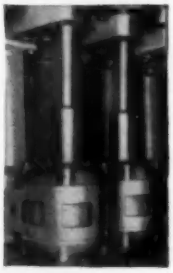

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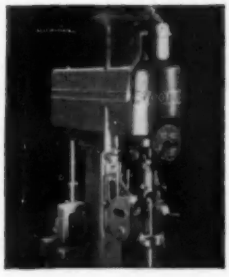

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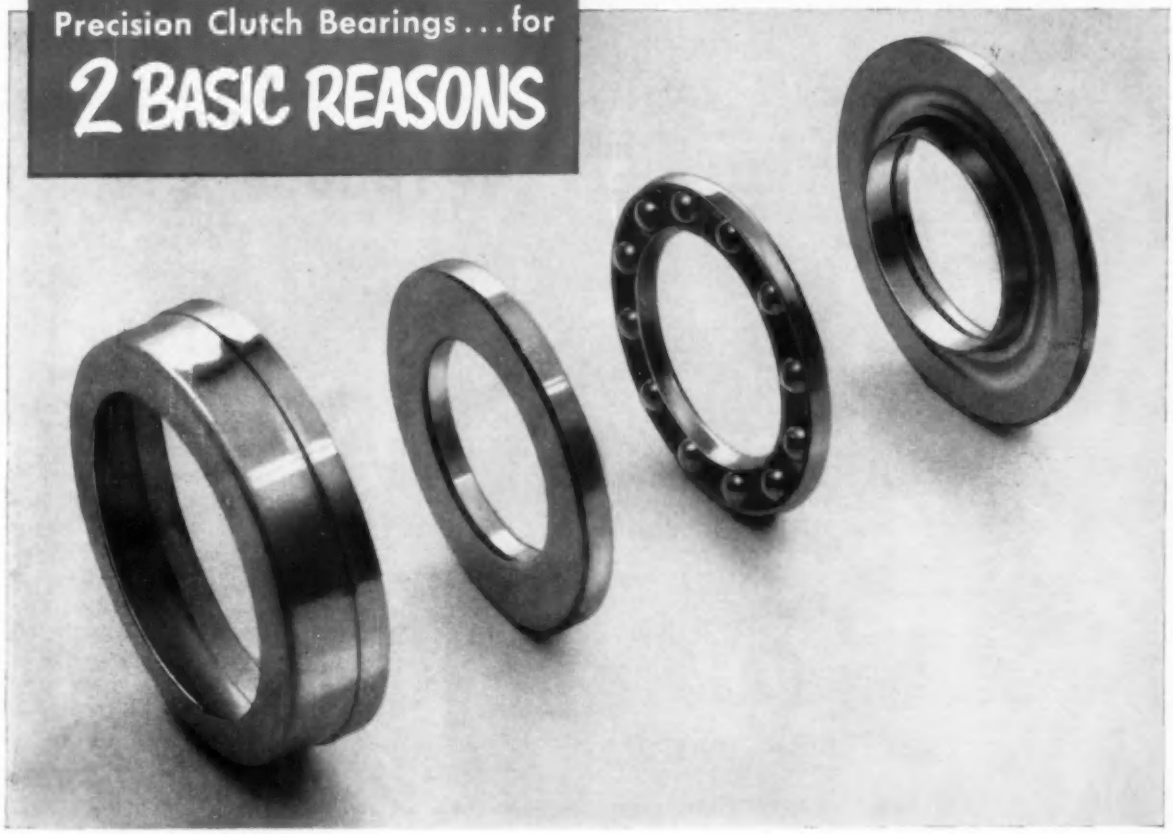

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Automatic Control of Bodies at Fisher Plant in Flint

Control center for the marshalling station. The console for switching bodies according to schedule is seen in the center.

Bodies come in from the undercoat booths on a conveyor line from the extreme left and are then switched onto one of four tracks at the operator's option.

A NEW marshalling yard arrangement, designed to provide a float of bodies for scheduling in an orderly fashion to paint, trim, and final assembly has been placed in operation at Fisher Body Plant 1 in Flint. Conceived and designed by the engineering and methods sections and constructed by the maintenance department, this automatic control scheme provides for a better work load distribution on final assembly lines.

The major problem, and one that confronts all large body plants, is that of properly scheduling the desired distribution of body styles in accordance with daily shipping requirements. In addition, it is necessary to maintain an adequate bank or float of various body styles so as to cope with interruptions that may occur at times on the lines ahead of the marshalling area.

The switch yard, some portions of which may be seen in the illustrations, consists of a massive framework of boiler plate and four conveyor lines. The heart of the control system for the entire operation is composed of some 8000 ft of electrical wiring running to the electrically-controlled, air-operated cylinders. The controls are centralized in a console, illustrated here, and are operated by a series of switches, each one having a special role to play in the scheduling of body styles.

The console is operated by one man, requiring but a flick of a given switch to operate a series of track switches which open to permit the proper body to roll by gravity to the proper location.

As illustrated here the delivery

of bodies to the scheduling area is handled on a single conveyor line leading directly from the undercoat booths. At this point the bodies are primed and ready for color coats.

The operator at the console is provided with a schedule indicating the order in which the various body types are to be fed into the line. As a body approaches the end of the conveyor ahead of the marshalling area, the operator directs it to one of four float conveyors, as illustrated. From the point of release the bodies move by gravity and the entire area, including the four conveyors, is properly pitched for this purpose.

As a body moves by gravity for switching to the proper float conveyor, it accumulates considerable inertia. For this reason there is an automatic brake at the head of each conveyor, actuated by a limit switch. As a body gets into position, a movable brake shoe is moved rapidly by means of two air cylinders to engage the side of the dolly and stop movement instantly.

At the exit end of the four parallel conveyor float lines—each one holding four bodies—there is a switching arrangement to converge all flow into a single conveyor line. This flow too is controlled by the console operator.

This scheme eliminates erratic body scheduling and makes for improved quality control. In addition, it provides the essential bank or float, making it unnecessary to stop operation in the event of interruptions on the various lines. As a result the entire operation can function smoothly and with a consequent elimination of down time.

This view shows two of the four storage conveyors in the foreground. The one at the extreme right transports bodies to the marshalling station. The console is at the right out of this view. The brake shoe arrangemnnt for stopping bodies as they enter the conveyor may be seen directly in the foreground.

At the exit end the four conveyor lines merge into a single track for transport to succeeding operations. Switching for this purpose is controlled by the operator at the console.

By
Andrew W.
Shearer

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Car Interiors Combine Beauty and Practicality

Monochromatic Colors, Non-Geometric Patterns, Novel Textures in Vogue as Fabrics Grow in Importance as Merchandising Aids

THE endless array of exotic patterns, textures, and materials found in the interior fabrics of 1958 passenger cars reflect the American flair for beauty combined with practicality. Pleasing in appearance, yet serviceable and durable, fabrics for every taste and pocketbook have become an important factor in automobile merchandising. The growing feminine influence in car purchases has been largely responsible for this trend. It is estimated that women cast the deciding vote in the purchase of seven out of 10 cars.

TRENDS IN COLOR AND STYLING

The most comprehensive analysis made to date of industry thinking regarding the styling and consumption of materials for the interior fabrics of passenger cars is found in Marketing Research Report No. 152, Agricultural Marketing Service, Dept. of Agriculture (published April, 1957). Entitled "Fabrics and Fibers for Passenger Cars," the report was based on a study carried out by staff specialists of Stewart, Dougall & Associates, Inc., of New York City.

The findings contained in the report relate to 1955 automobiles and are compared with the results of a similar survey in 1950. However, the predictions made three years ago by the some 50 automotive executives interviewed regarding future trends in styling and materials usage have come to pass to a marked degree as far as 1958 automobiles are concerned. There is every reason to believe that these trends will become even more pronounced when the 1959 and 1960 models make their respective

appearances in dealers' showrooms.

Color Trends

Monochromatic colors are being viewed with increasing favor. Public taste appears to be inclining toward the use of the same color for both the exterior and the interior with a strong accenting color used in moderate proportions. A balance in the use of heavy colors, as opposed to lighter pastel shades, is expected to continue.

Automotive trim colors in general tend to mirror contemporary trends in draperies, furniture upholstery, clothing etc. Brighter, more intense shades have been popular in recent years not only in automobiles, but also in wearing apparel, refrigerators, kitchens, etc. Medium shades, however, have been steadily gaining ground because they are said to offer greater soil resistance, better visual impact, and ease of blending.

Another body of opinion holds that colors reflect the national attitude. During periods of prosperity, brighter colors reflect good times, while duller colors come back if the economic situation changes. At the present time, there seems to be a growing interest in conservative colors and fabrics. All in all, no let-up is expected in the industry-wide effort to come up with new and varied color schemes because of their importance in sales appeal.

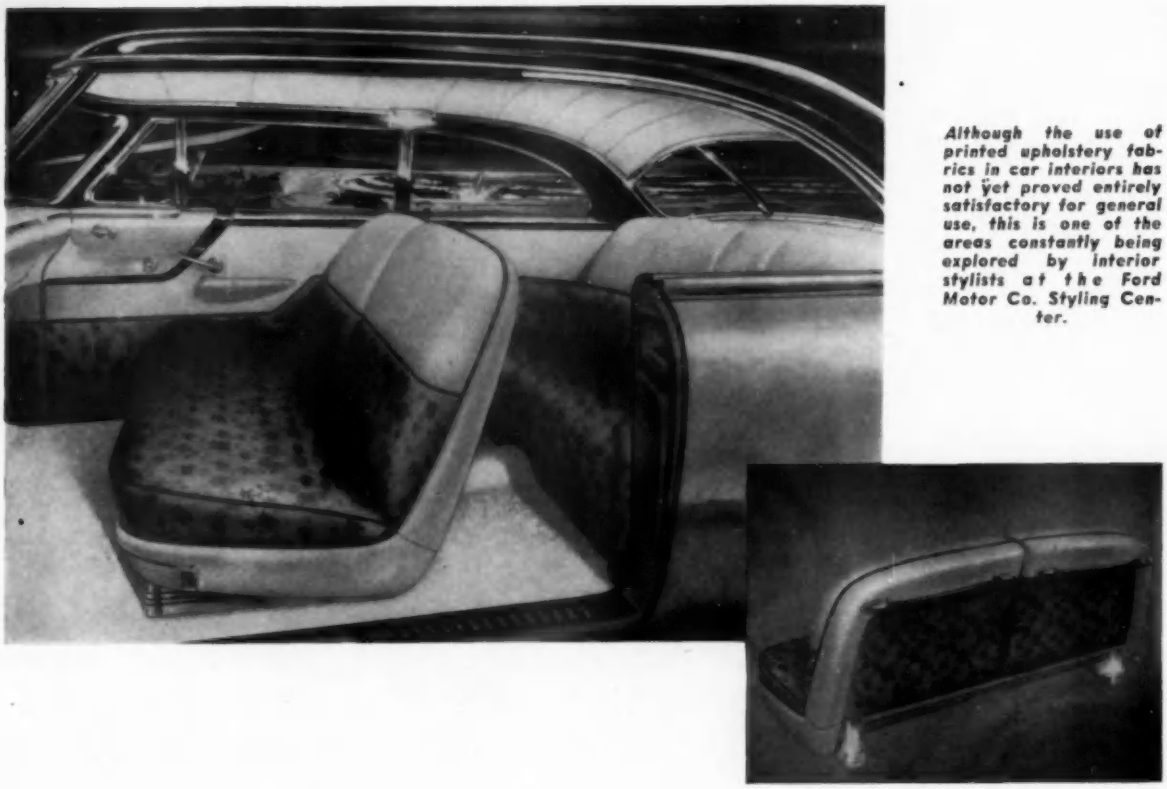
Fabric Designs

The trend in fabric design is toward large, modern non-geometric patterns and designs (abstracts, foreign motifs, free forms, large florals, curlicues, wiggles, mosaics, and leaves). Unusual textures—tweeds, brocades, three-dimensional effects, matelasses, counterpoint, etc.—are being used for some car models where large non-geometric patterns are not desirable.

There is a possibility that small, geometric patterns may come into increasing use (see Ford illustration), and greater interest is being exhibited in the more natural effect of fabrics as against some of the more elaborately textured and metallic fabrics. While some stylists may still harbor nostalgic feelings for the successful plain, striped, or checked patterns of

Eleven convertible models, by seven different car manufacturers, are available in full leather interiors for 1958. Typical of these is the Cadillac "62" convertible, one of eight Cadillac models offering leather upholstery in full trim, or in combination with other materials (Photo courtesy of Upholstery Leather Group, Inc.).

Spaciousness and high styling of the Chevrolet Impala convertible interior are apparent in this overhead view. The all-vinyl upholstery introduces an attractive three-tone effect.



Although the use of printed upholstery fabrics in car interiors has not yet proved entirely satisfactory for general use, this is one of the areas constantly being explored by interior stylists at the Ford Motor Co. Styling Center.

days gone by, there is every indication that the public has taken strongly to the new and modern motifs of recent years.

Trends in Sheen

Trim fabrics which have a good luster or sheen are now very much in vogue and are expected to remain so. More striking appearance, showroom appeal, and a general acceptance of synthetics which have a wide range of luster are conceded to be the major reasons for their popularity.

A desirable sheen can be obtained from such metallic threads as Lurex or with nylon. They provide a lustrous, rich, satiny look for interior fabrics that is not shiny to the point of being cheap looking.

Pile Versus Flat-Woven Fabrics

The trend toward increased use of flat-woven fabrics for automobile upholstery has become strong indeed. Types of flat weaves, such as Jacquard and matelasse, are becoming more and more popular. Principal reasons seem to be a general sentiment on the part of the public that flat-woven fabrics are more in keeping with today's styles and have a natural comfort and slidability.

Of a total of some 112 fabrics used by automobile companies during 1958, metallic yarn is contained in 55 of these fabrics. Every make of car uses at least one metallic fabric. Most of the metallic yarn includes two or more layers of Mylar (Du Pont) because of the toughness of this type of yarn and its ability to withstand "dyeing at the boil" and other fabric processes.

TRENDS IN MATERIALS USAGE

Any discussion of trends in the consumption of materials for passenger car interior fabrics cannot be divorced from styling developments because the two are so closely intertwined. The intensely competitive situation in the automobile industry today has increased the emphasis on creating more and more appealing styling effects with new materials as a sales stimulant. The number of materials and various combinations of fibers used to create interesting effects is many times what it was just a few years ago.

Trends in styling, and consequently in the usage of various materials, actually represent an evolution of ideas. Examples may be taken by going back to the year 1947. At that time, woolens and broadcloths were most in vogue. The widespread popularity of wool remained until the Du Pont Co. made nylon available to the textile trade in the form of filament. This immediately changed the styling trend. From striped woolen and solid color broadcloth, the trend went to striped nylon goods which still resembled wool and mohair, but which afforded brighter colors. Wool remains, however, as a popular fabric material in top car lines.

Today, there is a great use of nylon filament, rayon viscose, and cotton blends which make up the bulk of interior fabrics. With these blends and the introduction of Jacquard looms a few years back, automotive stylists were given

Shown installed in a 1958 Buick Roadmaster is one of the newest nylon fabrics for automotive interiors. A broadcloth-type, flat fabric, woven by Deering-Milliken of nylon stretch yarns, it has a soft hand, a subtle sheen, and a traditional broadcloth appearance, combined with nylon's strength and durability.

Bodycloth fabric in the Chrysler Windsor two-door hardtop has a high sheen filament viscose background complimented with an intermittent silver metallic stripe. The decor face of this fabric has a Jacquard free form shape with a ribbed background and is called "Bahama." Seats have a contrasting color line embossed horseshoe-style bolster with a vulcanized accent panel on the center of the seat backs. Door trim is vinyl simulated body cloth for easy cleaning—contrasting colored vinyl in a spear theme with vulcanized silver Mylar insert panel and crown motif.

much freer rein in the patterns or styles of any given fabric.

Recently, there has been a swing toward sports-type automobiles and, in looking for a new type of fabric for this line of cars, a tweedy-effect was developed and is now widely used. This is a fabric usually woven with slub or novelty-type yarns in the filling direction to give the fabric a nubby effect. Colors can become very interesting, and it is possible to weave an unlimited amount of color combinations into one fabric.

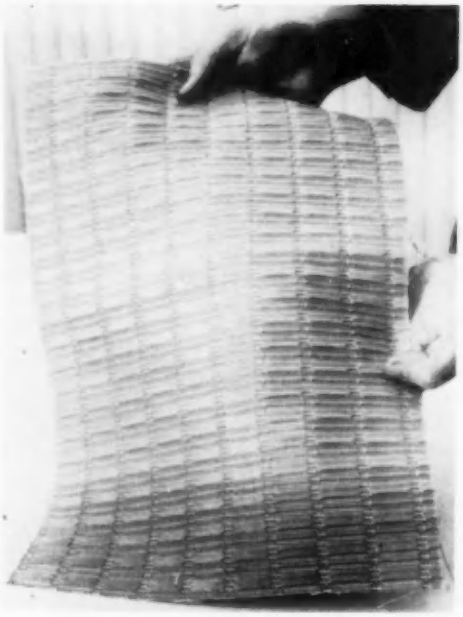
As mentioned above, the introduction of filament nylon and rayon were the start of the evolutionary development of today's interior fabrics. Then came new synthetic yarns, such as Orlon and Dacron, which can be blended with wool, silk, cotton or linen to make up unusual fabrics. Novelty yarns made up of nylon and rayon twisted around linens or cotton have also come into the picture recently. Among the distinctive features of these new synthetic yarns are high tensile strength, elasticity and toughness, flexibility, resistance to abrasion, and low water absorbency.

Cotton

Cotton is used in upholstery material, headlining, sidewalls, foundation sheeting, and seat padding of passenger cars (as much as 30 lb per car in some instances). During 1956 (the last year for which figures are available), cotton's share of a total market for all fibers of 220,000 cotton bale equivalents going into headlinings, sidewalls, and seat and bolster (upholstery) fabrics for passenger cars and trucks was 140,000 bales. The total market estimate excludes vinyl and other coating material used in coated fabrics.

About 480,000 cotton bale equivalents were used in seat padding and in cushioning materials over springs in surfaces and backs of seats in cars and trucks during 1956 and accounted for nearly 61 per cent of the market. Cotton used for padding is cotton waste and cotton linters rather than lint cotton.

Cotton usage by the automobile industry for visible interior trim has increased slightly in the last few years. Although nylon blends are replacing cotton-backed vinyls to some extent in upholstery applications, cotton is a principal filler in the former. Cotton is be-



Here is an example of the new three-dimensional, nylon-faced ladder pattern fabric used with complimenting top grain leather bolster in the Oldsmobile 98 Holiday sedan. It is available in five color combinations.

ing used to a considerable extent as backing in blends with other synthetics.

Consumption of cotton for sidewalls is increasing because of the trend toward more extensive use of cotton-backed vinyl for this application. The usage of cotton for headlining is decreasing somewhat because of the replacement of 100 per cent cotton fabrics by cotton-backed vinyls and the growing interest in foamed materials.

Wool

Wool is used primarily today in blends for the luxurious upholstery found in such high-priced cars as Cadillac, Imperial, and Lincoln. Commenting on the usage of wool broadcloth upholstery in de luxe models, the Wool Bureau states that the trend has been toward lighter shades in recent years. A wide variety of tans, grays, greens, and blues is currently in production.

Principal advantages claimed for wool broadcloth, aside from its look of elegance, are: its resistance to light fading, wrinkling or raveling, shrinkage, and soilage; strength and durability; safety; easy care; and softness. One of the most significant technological developments in the field is the development of the Scotchgard spot-proofiing process for wool fabrics by Minnesota Mining and Mfg. Co. It is said to make wool broadcloth impervious to oil-borne and water-borne liquids and greases of all types.

Vinyl

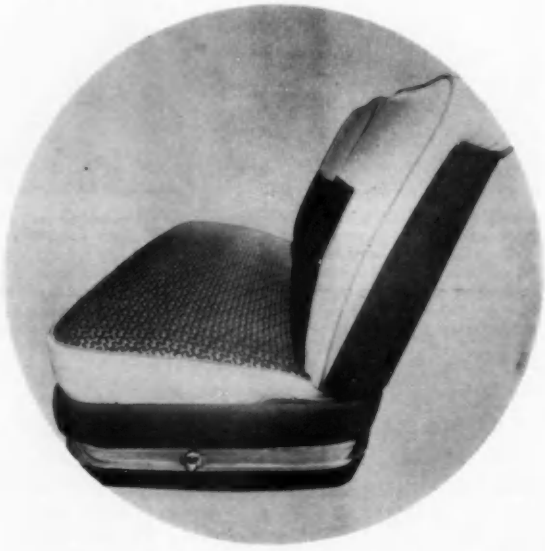
Vinyl-coated fabrics, such as osnaburgs and sheetings, are now being extensively used in passenger car headlinings because of their high construction strength, fade resistance, and versatility in colors and textures. For similar reasons —plus their ability to be dielectrically or heat-sealed to die-cut fiber board assemblies—drills and osnaburgs are also being widely used on interior door panels.

Vinyl films laminated to cloth constructions such as broken twills, elastic knits, and non-woven constructions, are found more and more in seating upholstery, often in combination with natural leather and body cloths. These vinyl fabrics, again, lend themselves to styling requirements, and represent strong and durable materials with a high degree of cleanability.

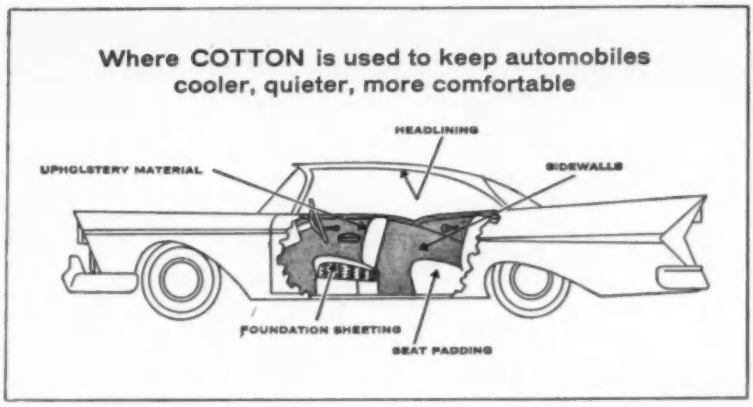
Current color trends in vinyl fabrics for the automobile industry seem to be toward higher metallic finishes introduced by Du Pont with softer color tones than those formerly used. While the popularity of metallics continues, pastels seem to be waning somewhat with new interest developing in conservative, solid color styling.

Door panel and headlining materials duplicate woven textile designs in many instances, while upholstery materials are most popular in the crush, calf and saddle grains simulating natural leather. Breathable vinyl fabrics appear to be slated for considerable popularity among the newer approaches to vinyl seating.

Of the recent technological ad-



Seating unit shows combination of breathable vinyl fabric with smooth finish and natural body cloth. (Photo courtesy of Vinyl Fabrics Institute).



Source: National Cotton Council

vancements in vinyl fabrics, the use of non-woven backings, the dielectric appliqueing of vinyl sheetings to coated fabric constructions, and the lamination of vinyl sheetings to steel prior to stamping operations for forming into interior trim components, are perhaps the most outstanding.

Nylon

Highly regarded by stylists for its great versatility, nylon has become a very important fiber in the automotive fabrics field. It has excellent dye qualities, is tough but easy to work with, has good lively colors, and presents a very attractive appearance. To cite other examples of its versatility, nylon can be dressed up with metallic threads and can be brocaded like silk.

Du Pont Co. reports that there has been a definite trend to nylon in automotive upholstery over the past eight years in all the major automobile lines. This trend is expected to continue, no matter what fabric types are in vogue at the moment, since nylon upholstery can be made in all the popular fabric types — tweeds, boucles, textures, friezes, damasks, matelasses, and broadcloth.

In line with this development, one of the newest and most interesting nylon fabrics for the automotive field is a broadcloth-type, flat-fabric, woven by Deering-Milliken of nylon stretch yarns. The stretch yarns give this fabric a soft hand, a subtle sheen, and a traditional broadcloth appearance, combined with nylon's strength and durability. The fabric handles like a standard nylon upholstery fabric with no unusual stretching properties. It is now being used in the Buick Limited, Roadmaster 75 (see illustration) and Super, and the Oldsmobile and Cadillac.

Aside from the wide selection of nylon upholstery, nylon is also used for automobile carpeting. A 100 per cent virgin nylon carpet, made by Barwick, has been used in the 1957 and 1958 Chrysler Imperial with excellent acceptance. Some automobile carpeting called "nylon" is actually nylon waste and will not provide anywhere near the same degree of long wear, beauty, and ease of upkeep that the aforementioned all-nylon type will. A continued bright future for nylon in the automotive fabrics field seems assured.

Leather

The leather upholstery found in 1958 passenger cars represents quite a step forward in the refined development of the material. According to the Upholstery Leather Group, new tannages, plus milling, providing unusual softness, have combined to result in the most advanced materials ever offered by the leather industry.

Nine additional models are offering leather upholstery during the 1958 model year. It is now available on 41 models out of a total of 10 different makes of cars. A host of new metallic colors are found on the surface of the leather upholstery used in 1958 car interiors. Formerly thought of primarily as a fabric for convertibles prior to the advent of the hardtop, leather is now used both in full trim and in combination with other fabrics on many types of cars.

Rayon

Due to a cost advantage and other factors, rayon maintains a good place for itself in the automotive fabrics field. Substantial quantities are used in upholstery, seat fabrics, floor carpets, and convertible tops.

With the increased emphasis on modern styling, more window area, etc., a need arose for seat upholstery and cover fabrics which would be high style, fire-resistant, color-fast, and offer strength without abrasion. The rayon industry answered this need with solution-dyed rayon filament yarns. This process, in which the color pigments are added to the viscose solution before spinning, has resulted in yarns that are fade-proof under virtually all conditions of exposure to light and cleaning. Every major weaver and cutter in the automotive market is now using these solution-dyed yarns in blends for upholstery and in all-rayon weaves for seat covers.

One of the several new rayon fibers recently introduced by American Viscose Corp., Avicron is the trademarked name for an Avisco filament yarn characterized by the ability to crimp when wet and to remain crimped after drying and during wear. Since it can be used 100 per cent or in combination with other yarns to produce interesting textures and patterns and in view of the decorative qualities inherent in its crimping ability, Avicron is expected to find widespread use in automotive carpeting and upholstery. Other prominent producers and suppliers of rayon are American Enka Corp., Industrial Rayon Corp. and Courtaulds (Ala.), Inc.

Skyloft, a lofted continuous filament rayon originated by American Enka Corp., was introduced in home carpeting in January, 1958. Adaptations for automobile carpeting had been shown in Detroit during the fall of 1957 and had been tested in laboratories of the car manufacturers after approval by

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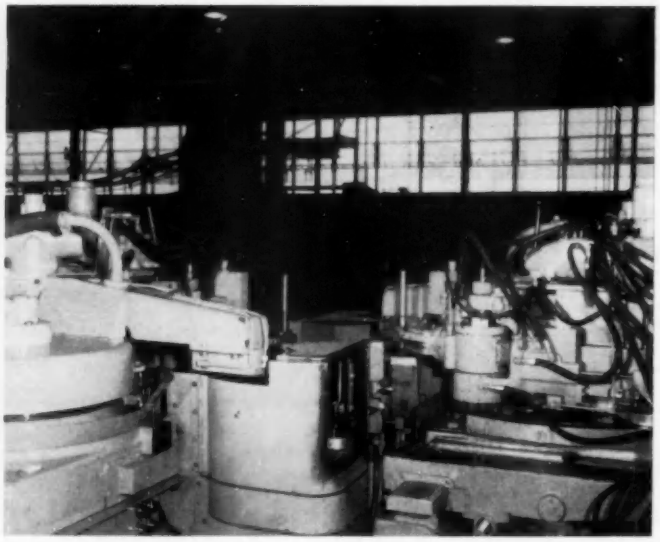
Thread, spline, and bearing diameters are finish turned automatically on the sector shaft.



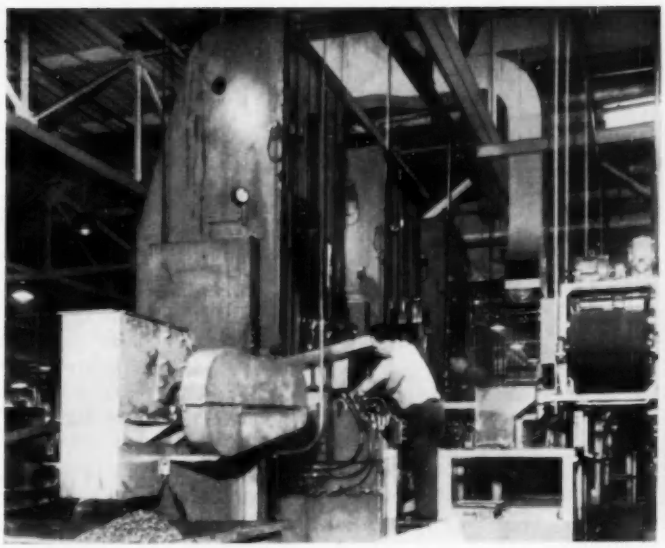
Sector shafts are lifted out of the working positions in which gear teeth are rough and finish cut in this special machine.

How Ford Makes Steering Gear Components

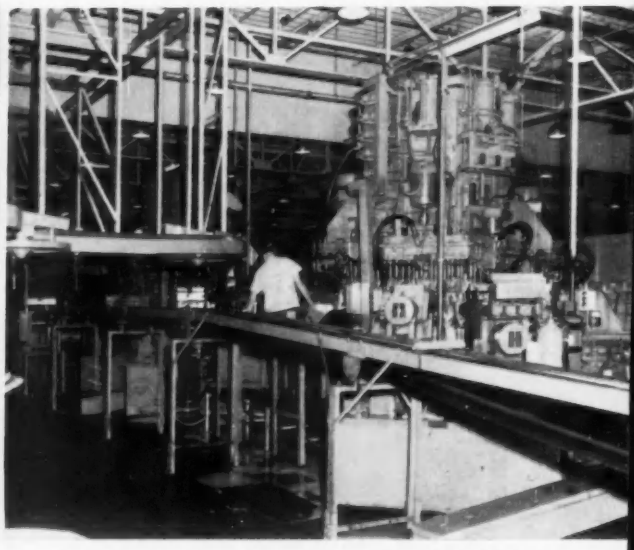
At Indianapolis, Ind., Ford Motor Company has built and equipped a plant to produce steering units, both power and conventional types, for the company's lines of Fords, Mercurys, Edsels, Lincolns and Continentals. It also houses much of the company's cold heading operations, including what is probably the largest bolt-making facility in the world. The plant has been in operation for less than a year. Because it was planned, built, and equipped for the operations now being conducted there, there are many interesting ideas in plant layout embodied in it. All steering gear heat treat furnaces are located in one area, and adjoining this area is the finish grinding section, so that pieces that have been fabricated up to the finish stage move to the furnaces for hardening, then to the finish grind area for final operations. All cold heading is likewise located in a separate area of the plant. Flow of material is in one general direction through all processing. Conveyorizing and materials handling systems, combined with automatic multi-purpose machine tools, give the plant efficient production.

The finish grinding department-bearing races in the rack nut and the worm are ground here.

The steering units, made at this plant and shipped to other Ford plants for installation into most cars in the company line, are built on production lines that are highly mechanized. In the gear are three components that are the heart of the unit, and also involve some of the most interesting manufacturing operations. These are the steering gear sector shaft, the steering



A battery of 90-in. stroke broaches rough and finish the teeth on the rack nut.



Guide holes and ball groove holes are drilled and reamed in the rack nut.

gear rack, and the steering gear worm. Motion of the steering wheel is transmitted through the steering shaft and the worm welded to it, to the rack, which in turn moves the sector shaft. Because all three of these components are of prime importance to the safe operation of the car in which they are installed, 100 per cent of the output is inspected for heat treat cracks as well as for dimensional accuracy.

Operations on the sector shaft begin with the rough forging, of SAE 5120 steel. Both ends are milled off simultaneously and the piece is centered, with a Motch and Merriwether and a Davis-Thompson machine performing the work. The machines are loaded by hand, and the pieces are picked up one at a time by hooks from a monorail conveyor. They next go to a Cleveland Tracer Lathe, automatically loaded and unloaded, where the diameters for the threads, serrations, and bearings are turned. Carbide cutting tools are used. Unloaded onto a belt conveyor, the pieces are carried to a National-Acme chucker, where the gear segment is faced off on both sides, and the gear face is turned at an angle of 1°32′. They are next carried to a Gleason Revacycle, modified to load and hold this workpiece, and gear teeth are rough and finish cut in the segment in automatic operations. The sector shafts are then delivered by belt conveyor to a Michigan Tool Co. Roto Flow machine, where the pitman arm splines and the threads are rolled.

Monorail conveyors then carry the sector shafts to the broaching area, where a T-slot is cut into the stub shank end on a 78-in. LaPointe Dual Ram broach. The T-slot is next deburred, and the piece then goes to an automatic plating operation, in which a few ten-thousandths of copper are laid down on the thread end of the shaft as a stop-off during the subsequent carburizing. This carburizing is done in a Holcroft furnace, with a treatment at about 1700°F for 14 hr to produce a deep case of about 0.040 to 0.060 in. An induction annealing at both ends of the shaft

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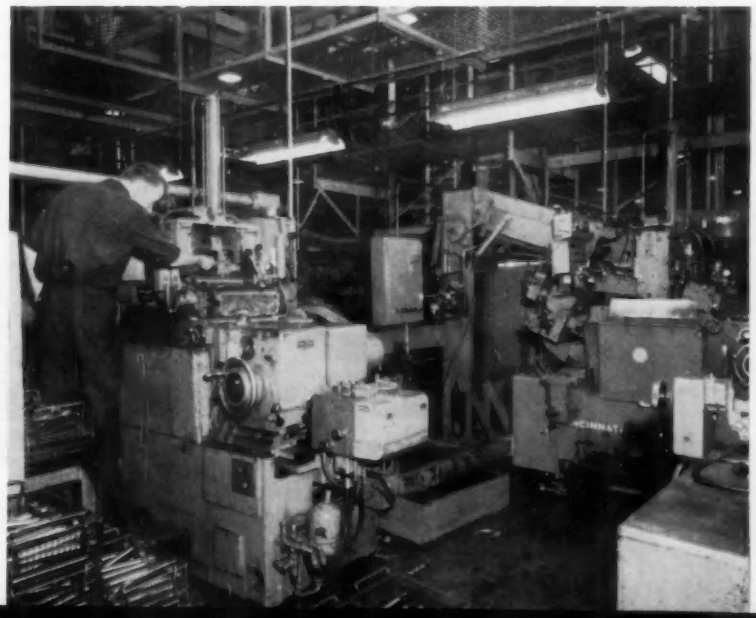
The centerless grinder in the foreground discharges into a conveyor that feeds into the grinder in the background, semi-finish and finish grinding sector shaft bearing diameters.



Trends in Polish Vehicle Industry

POZNAN, POLAND

WITH the growth of western economic links with Poland, reflected by the large-scale participation of America, Canada, Britain, West Germany, France, Italy, and other non-Communist countries at the Poznan Fair in June, developments within the Polish vehicle industry are viewed with increasing interest. Total output of trucks, buses and cars is now running at an annual rate of 25-30,000 units, which is a sizeable increase over the past few years but still well under the planned capacity of existing plants.

Manufacture of vehicles was introduced in Poland only after the war as a key part of an over-ambitious program for the rapid industrialization of that agricultural country. While this new industry has made considerable progress during the past decade, it continues to run inefficiently and on an extremely high-cost basis, and is suffering from a number of handicaps.

Substantial help from Russia has been received in the form of investment goods, licensing agreements and technical assistance, but in some cases this was provided without due consideration of the actual conditions in Poland. The virtual absence of a supporting industry with factories making components like wheels and brake assemblies forces a high degree of integration on the main plants.

They are therefore required to spread their limited productive capacity over an abnormally wide range of parts made only in small quantities. Further, the supply of semi-skilled and skilled manpower is limited by severe wartime losses and by the absence of a strong engineering tradition in the country. And the manufacture of military equipment, including jet engines and tanks, has been a tremendous drain on the meager resources. In addition, there is some feeling within the industry itself that the relatively few engineers and designers available to it are dissipating their talents on stillborn proto type vehicles instead of improving existing models.

The situation in the three main vehicle factories illustrates some of these difficulties. The Zeran plant near Warsaw (see A.I., August 15, 1956) started operation in 1950, and is tooled up largely with Russian machines to produce the Warszawa passenger car, which is basically the Pobieda made under Soviet license. Although the Soviets supplied all this on long-term credit, the attempt to create a miniature Russian factory in Poland seems ill-advised.

The parent plant at Gorky was built in 1932 with the help of Ford, and incorporated Ford ideas on mass production and far-reaching integration that were suitable for Russia. But the validity of these concepts broke down when transplanted to a small country.

For example, Zeran with a planned capacity of only 25,000 cars a year is equipped with a number of automatic machines, including transfer lines, that are grossly under-utilized. And without the benefit of many outside suppliers, it must make a very high proportion of components locally. When this cannot be done, as in the case of coil and leaf springs, the necessary parts are imported from Russia. On top of this, after eight years the factory is still operating at less than half capacity, mainly because of material shortages.

Thus Zeran, representing a large capital investment, is turning out only some 50 cars a day, and these at a basic cost of approximately $2500 each (calculating from the fairly realistic currency exchange rate for tourists of 24 zlotys for one dollar). Domestic selling price of 120,000 zlotys is nearly twice this amount, and is the equivalent

San bus seating 43 passengers uses the engine, transmission and axle assemblies of the Star truck with an integral body frame

By David Scott
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

Quarter-ton Stal 300 van is powered by a 14-hp aircooled engine

of over eight years' average wages in Poland. At such a price and with no consumer credit in the country, even 50 Warszawas a day represents over-production in relation to real demand. Many are unsold, despite the great popular desire for cars.

On the other hand, the export price of this model is in the region of $1200: the State-run foreign trade corporation is apparently prepared to sell it abroad at less than half production cost in order to earn much-need foreign currency. Meanwhile, the Polish people are making up the difference out of their pockets by existing on one of the lowest living standards in northern Europe.

The present design of the Warszawa itself is a further drawback, since it has an outdated L-head engine and an adverse power-weight ratio. Although ruggedly built and therefore well suited to Polish roads, it is uneconomic to run as well as to make. A few modifications of the original Soviet design have been made in recent years, resulting in improved performance, but the cost of retooling all the automatic production equipment has so far ruled out any major alterations or a complete model changeover.

It is a matter of interest that Poland's early post-war plans for a car factory were less ambitious and perhaps more realistic. In 1947 it decided to build the Fiat 1400 under license, sent 20 engineers to Turin for training, and received plans for the construction of two assembly halls at Zeran providing an annual output of 12,000 cars.

This project collapsed in 1949 when Poland rejected the Marshall Plan, and a few months later the decision was taken to make Pobiedas. Reorganization started after a period of considerable confusion, and assembly of the Russian car at the new factory began in 1950. This evolved into manufacture as the Soviets provided more and more actual production equipment, and now most of the parts are made locally.

Ten-passenger Nysa microbus is also produced as a ¾-ton panel van. Basic components are from the Warszawa car.

Another Polish plant with a Russian background is the one at Lublin making GAZ-51 trucks under license. Activities there are confined mainly to assembly in limited numbers, and since the investment is relatively small, production costs are not unreasonable. But the 2½-ton truck itself is now felt to be the wrong size for Poland —too large for farm work and city deliveries, and too small for long-distance road transport. Thus it is understood that manufacture of this vehicle will cease in the near future, and Lublin will be devoted to making castings, forgings and other components for existing automotive factories.

The Starachowice plant is of purely Polish extraction and con-

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Handling Connecting Rods in Automatic Equipment

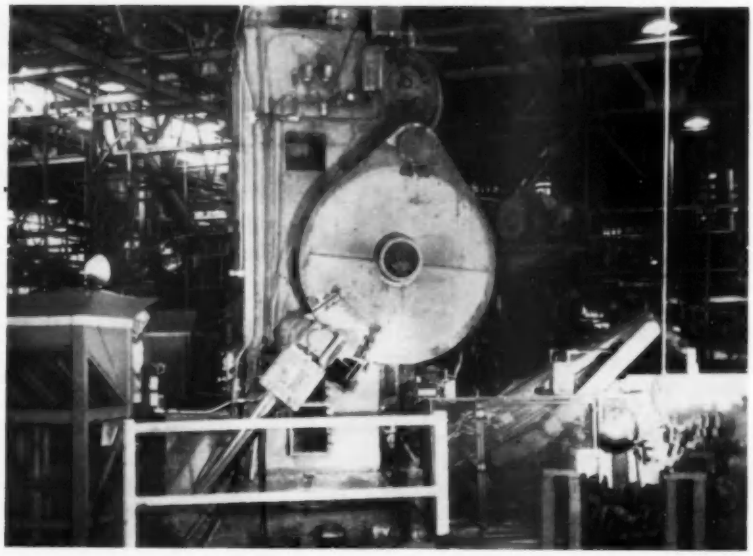
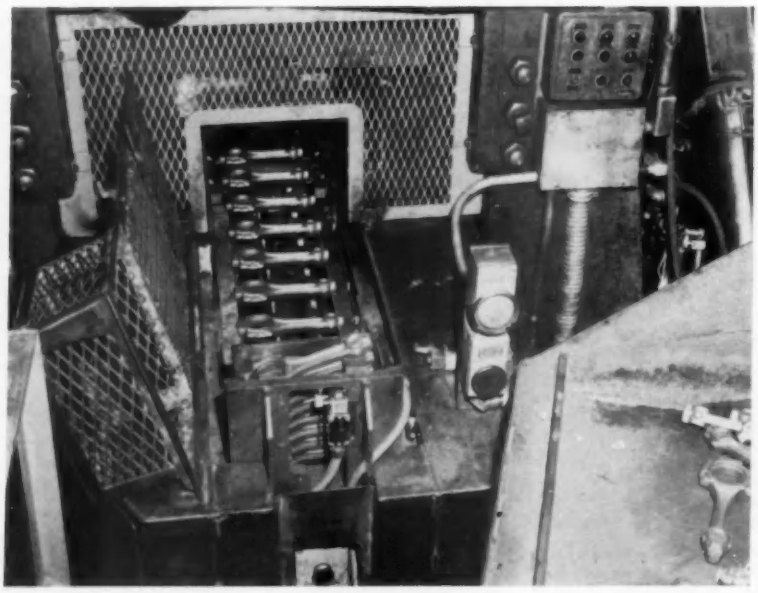


Fig. 1—Coining press equipped with a positively driven walking beam device that feeds connecting rod forgings automatically into the die from a hand fed magazine. Forgings are picked from bin at left and are discharged onto the inclined conveyor, right.

Fig. 2—Closeup of the magazine and the walking beam setup that transfers the forgings through successive positions and loads them, one at a time, into the recessed coining die of the press, Fig. 1.



By Herbert Chase

In the Forge Plant of Oldsmobile Division, General Motors Corp., Lansing, Mich., the production of connecting rods is facilitated by special handling equipment.

After forging, the rods are heat treated and shot blasted to remove scale. Before shipment to machine shops each rod requires coining the sides of each end and on intermediate areas of the H-shaped section. In this coining, the thickness reduction ranges from 1/32 to 1/16 in. and thickness is held within 0.050-in. tolerance.

As the rods are coined at room temperature, heavy pressure is required. This coining is done in a 1200-ton knuckle joint press, Fig. 1, equipped with a single-cavity recessed die. Until recently, the die was hand loaded and rods were discharged to gondolas that were trucked to a stress relief furnace. There, they were hand loaded onto the furnace conveyor that discharged into gondolas moved by fork trucks.

To minimize manual handling and to attain improved operation through the coining press and furnace, several changes in the setup have been made. Forgings ready for coining are dumped into a hopper feed bin, left in Fig. 1, and slide down an incline to a point adjacent to the magazine, center in Fig. 2. There, the press operator picks up the forgings two at a time and deposits them in the magazine.

Normally the press strokes continuously, making 27 working strokes a minute, but it can be stopped and restarted by palm but-

tons if needed. From the magazine, the rods feed onto walking beams that advance the rods in uniform spacing until, at the end of the feeding device, each rod is loaded into the coining die. A combination of up and down and transverse motions that are synchronized with the press, of course, by a positive drive, produces the required feed into the die. Ejection from the die is automatic, into a chute discharging onto an elevating oscillating conveyor for advance onto the moving hearth of the stress relief furnace, Fig. 3. This feed, being at constant rate, spaces the rod forgings uniformly across the furnace conveyor and they advance through the furnace at a uniform set rate.

In the furnace, the rods attain a temperature of 1100 F at which they are held for 50 minutes before discharge via one of two steel slat conveyors into gondolas at the end of the furnace, Fig. 4. Formerly, gondolas, which fill rapidly, required frequent removal and replacement by a fork truck, causing frequent work stoppages. To avoid this, the mechanical handling setup, Fig. 4, has been provided. It includes two parallel roller conveyors running at right angles to the furnace and its discharge conveyors.

Empty gondolas are unloaded by fork truck onto the outer of the two roller conveyors, right in Fig. 4, and move by gravity toward the center of this conveyor. There, two gondolas stop opposite the loading stations at the center of the other roller conveyor. When two gondolas in these stations (one below the end of each furnace discharge conveyor) are filled, a horizontal light beam across the tops of the two gondolas is broken by the pileup of the forgings.

This actuates the "electronic eye" of a photoelectric cell and results in stopping the furnace discharge conveyors. Thereupon, air operated pushers are released and move the two loaded gondolas in opposite directions and then release them to roll by gravity to the two ends of the roller conveyor upon which they rest. When the two loaded gondolas move out of the loading stations, another air operated shifter picks up and transfers the two central empties transversely into the loading station.

As soon as this occurs, the two transfer devices move back to starting position, ready for a subsequent shift after loading, and the two furnace discharge conveyors are restarted. Then, an empty from each end of the outer roller conveyor rolls by gravity toward its center and stops in position for subsequent shift into loading position.

In this setup, there is space for four loaded gondolas at each side of the loading position and for

(*Turn to page 97, please*)

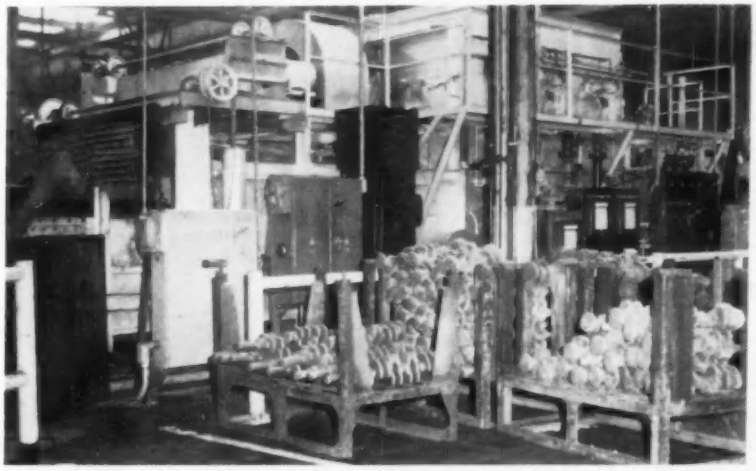


Fig. 3—A furnace equipped for continuous normalizing of coined connecting rod forgings at a specified rate in a 50-minute cycle. One conveyor feeds rods, as fast as they are coined, to the moving hearth and they are discharged onto two steel slat conveyors. Crankshafts in racks shown in foreground are not processed in this furnace.

Fig. 4—Empty gondolas on the roller conveyor at right are transferred automatically as required to the loading position, below furnace conveyors, on the parallel conveyor. When filled, the gondolas are moved longitudinally by air-operated shifters to make room for another empty. The system may operate to transfer single gons or two at a time as signaled by the electric eyes.

British-Built Diesel for Ford F-600 Trucks

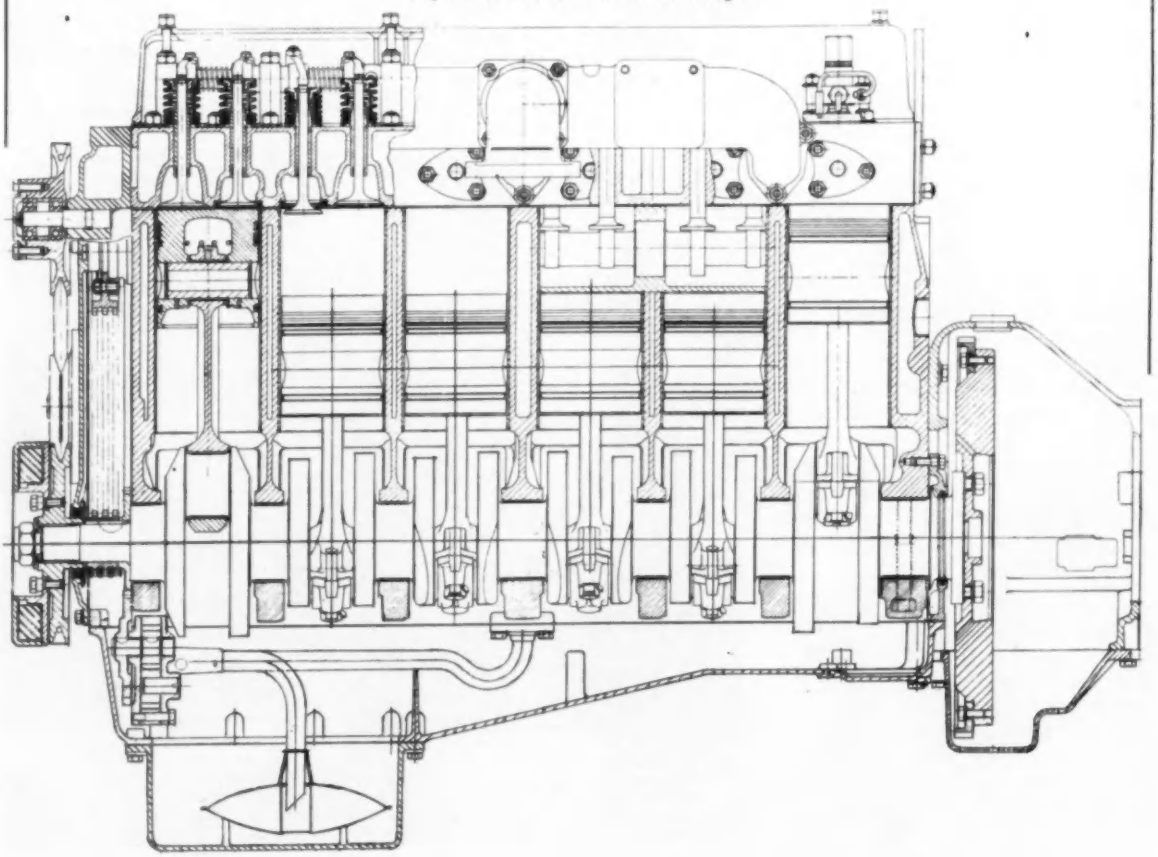
CONDENSED SPECIFICATIONS PERKINS F340 DIESEL

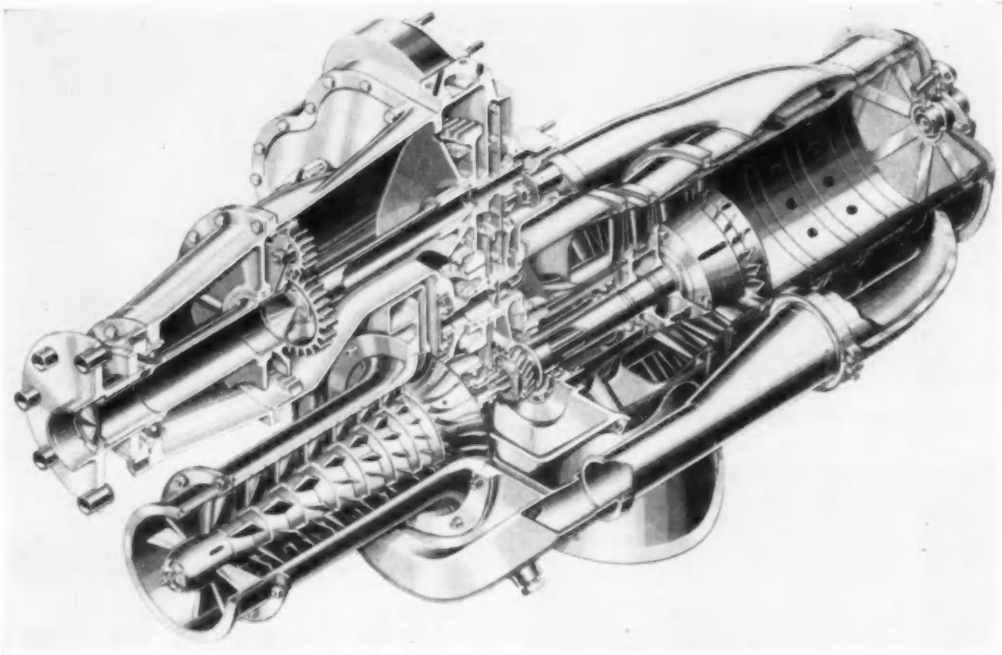
Number of cylinders	6
Bore (in.)	4
Stroke (in.)	4.5
Displacement (cu in.)	339.3
Compression ratio (to 1)	17.5
Torque (lb ft @ 1700 rpm)	240
Horsepower (max @ 2850 rpm)	110

SHOWN here are two views of the Perkins F340 Diesel engine which will be used in Ford's 154-in. wheelbase F-600 trucks. These vehicles will be available from all Ford sales and assembly plants outside America. This optional equipment was described in the July 15 issue of AUTOMOTIVE INDUSTRIES, page 35.

Left front quarter view of new Perkins engine

Longitudinal section of the F340 engine





Part cutaway view of the Allison 250-B2 turbo prop-jet engine

The New Allison 250-Hp Turbine Engine

THE USAF and U. S. Army have recently awarded the Allison Division of General Motors a contract for the development of a 250-hp turbine engine for light planes and helicopters. This Allison Model 250 engine is said to be the first high performance, small gas turbine engine to be introduced into the military and commercial light plane field. The new contract is for engineering development only and will not affect Allison's current employment level.

There are two models of the 250-hp engine. One is a prop-jet or a gas turbine engine which drives a propeller. This version weighs only 106 lb and is less than 39 in. long. Army application for the prop-jet would include light planes for airborne command posts, aerial spotting for ground gunfire, liaison-type flight operations and observation and utility helicopters. The Army said other applications could include powerplants for target drones, flying jeeps and unmanned reconnaissance planes.

The other model is a turbo-shaft engine weighing 90 lb and is less than 35 in. long. Instead of driving a propeller, the turbo-shaft model has a power takeoff. The turbo-shaft version can be applied to rotating wing aircraft, marine installations, or used as auxiliary powerplants as well as standby powerplants for gun turrets, emergency vehicles, etc.

Model 250 incorporates a free turbine principle. Air enters the compressor and is discharged through a diffuser. The compressed air then flows through two external ducts to the combustor chamber where fuel is injected and the mixture burned. Here, air flow is reversed and passed through a gas generator turbine and then on to the free power turbine. A shaft is connected to the free power turbine and through a series of gears transmits power to the propeller shaft at the required speed in the case of the prop-jet, or to a power takeoff in the turbo-shaft version.

The 4-1 power to weight ratio of the Model 250 engine is attainable through compact design and use of light metal components.

Magnesium is used for the central support housing. Compressor and turbine blades are made from sheet metal with the compressor disks fabricated from plastic. Blades are integrally-cast with compressor disks and turbine wheels and are easily removed for inspection or replacement with minimum hand tools.

The reduction gear box contains all power and accessory gear trains, torque sensor, shaft brake, oil pumps and main support bearings. The single can combustor is the same type used on the military T56 and commercial 501-D13 Allison prop-jets. The fuel nozzle, on the after end of the engine, is a non-clogging single duplex nozzle easily removed for inspection.

Engine control is through a hydromechanical system consisting of a fuel pump and filter, gas producer fuel control, and a power turbine governor. Four thermocouples sense turbine inlet temperature. Minor changes convert the turboshaft to a prop-jet.

Finely sculptured lines and complete absence of chromium trim on Ferrari 250 GT with new production coupe body by Pinin Farina

Rear wrap around window on Mercedes-Benz 300 SL convertible fitted with detachable top

Early Announcements of 1959 Models in Europe

Fiat 500 Sport has sheet metal top, two-color scheme

Face-lifted Alfa Romeo Giulietta Sprint is distinguished by unobtrusive rear fender tips

SEVERAL of the European sports car manufacturers have already announced their 1959 models which all show a distinct tendency towards more speed and power. Smallest of them is a factory-tuned version of the Fiat 500. With a slightly increased bore (2.65 in. instead of 2.60) the displacement of 30.5 cu in. makes full use of the 500 cc limit popular in Europe. With a higher compression ratio (8.5 instead of 6.55 to 1), a redesigned cylinder head, larger valves, a new carburetor and more valve opening, maximum output is raised from 16.5 to 21 bhp.

Apart from a face lift which brings its front end appearance in line with that of the new 2000, the Alfa Romeo Giulietta Sprint coupe has increased compression ratio (from 8.0 to 1 to 8.5 to 1), modified carburetor settings and two Y-shaped exhaust pipes to its versatile 79 cu in. twin OHC engine. The modifications have raised bhp from 70 to 80 net at 5500 rpm.

For the first time Ferrari has announced a bona-fide production model. This is a new version of the 250 Gran Turismo three liter, the coupe body being built by Pinin Farina. The body framing is welded to the tubular chassis frame, and rearrangement of the frame has resulted in more interior and trunk space. The 183 cu in. V-12 engine retains its dimensions (bore 2.9 in., stroke 2.3 in.) and is claimed to develop 240 hp at 7000 rpm. A lighter version with body by Scaglietti is designed for competition in the Gran Turismo car class and 260 to 270 bhp are claimed.

With its new Typhoon VII engine built by Chrysler the Facel-Vega HK 500 coupe built in France should be one of the world's fastest four. The 36' cu in. V-8 engine has identical dimensions as the larger DeSoto unit. With a compression ratio of 10.25 to 1, bhp of 355 at 5200 rpm is claimed. The engine is fitted with two four-barrel carburetors. The Chrysler Torque-Flite transmission or a fully synchronized four-speed unit built by Pont-a-Mousson in France are available. Power brakes are standard, and power steering, Rudge wire wheels, and tinted glass are available as optional accessories. A four door hardtop model, having identical engine features but weighing 4300 lb instead of the 3600 lb of the HK 500 carries the model name of "Excellence."

Titanium Alloys Developed for Aircraft-Missile Applications

CRUCIBLE B-120VCA, one of three new titanium alloys developed by the Crucible Steel Co. of America, is reported to be the first all-Beta titanium alloy to be produced. All-Beta alloy means the high-temperature structure of titanium; a similar structure would be the austenite form of stainless steel.

All three metals are "formageable"; capable of being readily formed in the so called solution-treated or "soft" condition and then strengthened by simple thermal aging treatments.

The alloys, namely Crucible C-105VA and Crucible C-115AMoV, along with the all-Beta alloy, have been designed to meet the specific requirements of the advanced aircraft and extended-range missile fields. They are also expected to find wide acceptance in the marine and processing industries where highly corrosion-resistant metals are required for plumbing, piping, etc.

Since there can be no all-purpose product able to meet all of the varied problems encountered in designing aircraft and missiles, Crucible has developed each alloy to provide the best combination of properties for many applications.

The three major categories of titanium alloys are as follows: A, alpha, the hexagonal close packed crystal structure; B, or Beta body-centered cubic crystal structure; and C, or combined alpha and beta crystal structures. These classifications tell more about general properties of the specific chemistry. Thus, alpha has all-around strength, stability, toughness and weldability but not the best formability. Beta has the best strength and fabricability but not the best long-time, high-temperature stability. Combined alpha-beta has the best compromise strength, formability and stability. A brief description of the three alloys follows:

C-105VA

C-105VA is an alpha-beta titanium-base alloy containing a nominal alloy content of 16 per cent vanadium and 2.5 per cent aluminum. The vanadium is used to stabilize enough of the beta phase for good heat treatment response, while the aluminum improves elevated temperature properties.

Principal applications to date are for sheet metal parts requiring excellent formability and high aged strengths. In addition, preliminary results on plate, bar and billet indicate some promise for these forms for aircraft and missile parts.

C-115AMoV

The basis for the development of C-115AMoV was to provide a composition which could easily be formed in the solution treated condition and subsequently aged to higher strength levels with adequate service ductility. The latter condition is met by the additions of three per cent molybdenum and one per cent vanadium which impart a useful heat treatment response. This amount of beta stabilizer content also provides for good elevated temperature stability.

A four per cent addition of aluminum improves the elevated temperature strength characteristics and thus increases the alloy's service range with only a small sacrifice in room temperature formability in the solution treated condition.

The resultant composition offers: improved formability in the solution treated condition; improved strength properties, both at room temperature and elevated temperatures in the aged condition; and elevated temperature stability in the aged condition to at least 800 F.

Applications are for aircraft sheet requirements requiring both excellent formability and heat treated strengths of 170,000 to 190,000 psi ultimate, with about 6 to 10 per cent elongation.

B-120VCA

Titanium has both high and low temperature crystal structures. The high temperature of structure of titanium is called beta and can be stabilized to room temperature by large alloy additions. This structure is, in effect, a quite different metal from its base.

B-120VCA, the only all-beta titanium alloy, is said to have the highest strength and best formability of any titanium base material. It is ductile-weldable, cold-headable and has a very great and deep hardenability which appear to fit it for high strength-weight honeycomb foil at one extreme and for thick heat treated sections at the other.

The basis for its development was the need to stabilize the high temperature beta structure down to room temperature in order to secure the advantages of beta's formability. This led to the addition of a relatively large amount of alloy beta stabilizer elements; namely, 13 per cent vanadium, plus 11 per cent chromium. Four per cent aluminum was then added for proper balance of the alloying elements so that the structure stays all-beta during forming and/or during slow cooling and ages to high strength levels at short times and low temperatures but still does not overage either brittle or weak in service.

This alloy is currently being tested in applications such as aircraft skins, stiffeners and other primary structural shapes requiring high strength for long times at temperatures up to at least 575 F and optimum formability. Preliminary tests show that B-120VCA is excellent for honeycomb construction. It appears to be suited also for missile applications such as pressure tanks and casing skins and structural members requiring good strength-weight ratio for a few hours up to 1000 F and shorter times up to 1400 F. It has large potential in aircraft and missile rivets and bolts since in many instances it has shown excellent cold headability.

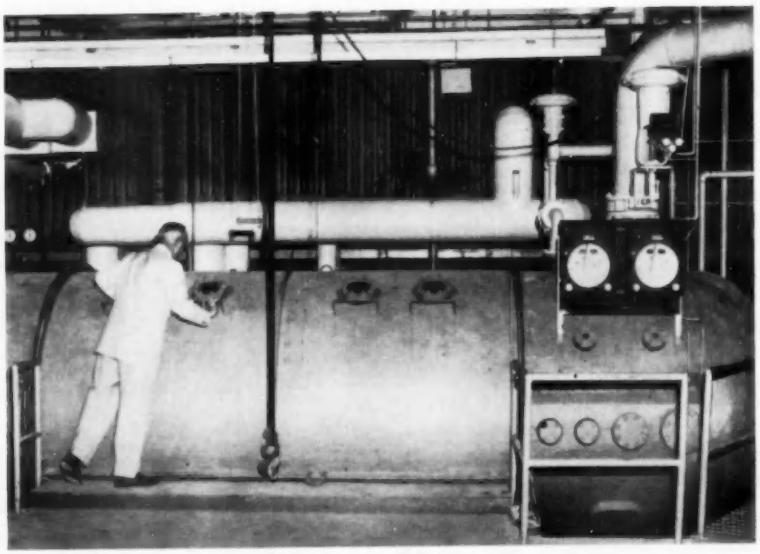
Complete Testing Equipment in JANITROL'S COLUMBUS PLANT

THE Janitrol Aircraft Division of Surface Combustion Corp. has started operations in its $2,500,000 plant in Columbus, Ohio. The new plant occupies 130,000 sq ft of engineering, manufacturing, and administrative floor space.

The altitude chamber, one of the largest of its type in the country, is one of the very few privately owned facilities available full-time for research and environmental testing of commercial products. It simulates conditions at from the ground to altitudes over 22½ miles above the earth and is used to develop and test Janitrol's missile and aircraft components for reliability. A unique feature of the chamber is its extraordinary "heat rejection" rate while maintaining high altitude conditions. It is capable, for instance, of testing an aircraft heater in operation, generating 1 million Btu per hour, while temperature in the chamber is held to —65 F. and simulated altitude maintained at 80,000 ft.

In the manufacturing of specialized components for such aircraft as the Boeing 707 and the Douglas DC-8 jet airliners, as well as in such missiles as the Regulus II and the Talos, every component must be tested to insure that it will stand up, especially because of the critical use of many of them. The chamber will be used to test such components as duct couplings and supports, heat exchangers and pneumatic controls.

The plant has been planned with change in mind. There are no production lines as such, but a flexible system of combining machines and automated techniques for a particular job. Anticipating future change, the building which occupies 2½ acres is situated on a 16-acre site to allow for expansion.



New high-altitude environmental test chamber with a Janitrol DC-7 heater on test

Testing a Janitrol 32,000 peak voltage ignition system on a 1200 lb. force vibration testing machine capable of simulating vibration frequencies up to 3 kc/sec and vibration amplitudes up to one inch

• • INDUSTRY STATISTICS • •

WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Make	Weeks Ending		Year to Date	
	Aug. 2	July 26	1958	1957
PASSENGER CAR PRODUCTION				
Rambler	3,004	4,177	110,834	62,759
Total—American Motors	3,004	4,177	110,834	62,759
Chrysler	48	1,239	35,547	82,904
De Soto	15	452	23,101	80,918
Dodge	254	2,334	66,564	196,817
Imperial	2	83	8,330	28,057
Plymouth	7,235	8,544	238,516	443,914
Total—Chrysler Corp.	7,554	12,652	372,058	832,610
Edsel	326	0	7,603	4,877
Ford	15,506	21,115	581,099	959,536
Lincoln	309	286	16,079	26,127
Mercury	0	3,530	72,161	194,002
Total—Ford Motor Company	16,143	24,931	676,942	1,184,542
Buick	0	0	133,111	264,573
Cadillac	2,822	3,216	89,510	99,828
Chevrolet	29,590	26,631	830,024	942,346
Oldsmobile	2,388	7,470	203,146	257,514
Pontiac	1,322	5,181	136,675	226,692
Total—General Motors Corp.	36,122	42,518	1,392,466	1,790,953
Packard	0	75	1,723	4,603
Studebaker	24	1,157	21,601	37,582
Total—Studebaker-Packard Corp.	24	1,232	23,324	42,185
Checker Cab	0	36	2,120	2,596
Total—Passenger Cars	62,847	85,546	2,577,744	3,915,645
TRUCK AND BUS PRODUCTION				
Chevrolet	5,299	6,137	173,013	218,568
G. M. C.	1,064	1,223	36,777	41,350
Diamond T	0	0	3,126	3,136
Divco	0	60	1,606	1,939
Dodge & Fargo	1,359	1,342	36,448	48,273
Ford	4,784	3,763	132,467	217,100
F. W. D.	0	19	759	677
International	1,406	1,481	55,356	72,799
Mack	279	283	8,777	10,358
Studebaker	48	144	6,437	8,208
White	111	98	9,875	11,668
Willys	1,922	2,040	49,963	46,115
Other Trucks	40	50	1,810	2,663
Total—Trucks	16,312	16,640	516,418	683,854
Buses	97	75	2,034	2,678
Total—Motor Vehicles	79,256	102,261	3,096,196	4,602,177

1958 TRUCK TRAILER SHIPMENTS

Industry Division, Bureau of the Census

Type of Trailer	May	Five Months 1958	Five Months 1957
Vans			
Insulated and refrigerated	281	1,345	2,079
Steel	20	161	294
Aluminum	261	1,184	1,785
Semi-insulated	50	215	333
Steel	50	215	55
Aluminum			278
Furniture	163	737	901
Steel	163	737	817
Aluminum			84
All other closed-top	1,323	6,093	8,721
Steel	354	2,041	4,268
Aluminum	969	4,052	4,453
Open-top	121	668	1,428
Steel	49	338	755
Aluminum	72	330	673
Total Vans	1,938	9,056	13,462
Tanks			
Non-and low pressure			
Petroleum			
Carbon and alloy steel	175	975	.....
Stainless steel	22	107	.....
Aluminum	111	528	.....
Total—Petroleum	308	1,610	2,367
Chemical, food, fluid solids	44	310	.....
All other, incl. aircraft refuelers	68	136	.....
High pressure (LPG, chemicals, etc.)	24	129	.....
Total—Tanks	444	2,185	3,149
Pole, pipe and logging			
Single axle	26	133	247
Tandem axle	33	175	366
Total	59	308	613
Platforms			
Racks, livestock and stake	140	648	912
Grain bodies, all types	74	334	773
Platforms (flats), all types	539	2,090	3,441
Total—Platforms	753	3,072	5,126
Low-bed heavy haulers	236	971	1,535
Dump trailers	290	894	1,066
All other trailers	184	770	1,521
Total—Complete Trailers	3,904	17,258	26,472
Trailer chassis[1]	292	1,305	1,355
Total—Trailers and Chassis	4,196	18,563	27,827

[1] Sold Separately.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	June 1958	May 1958	June 1957	Six Months 1958	Six Months 1957	Per Cent Change: June over May	June over June 1957	Six Months 1958 over 1957
1	New England	24,303	26,411	29,786	131,296	163,351	— 7.98	—18.41	—19.62
2	Middle Atlantic	88,011	84,345	108,239	461,693	590,488	+ 4.35	—18.69	—21.81
3	South Atlantic	49,943	60,002	63,313	304,656	394,558	—16.76	—21.12	—22.73
4	East North Central	95,400	98,557	124,997	555,567	771,854	— 3.20	—23.68	—28.02
5	East South Central	17,428	16,339	22,557	104,243	147,307	+ 6.67	—22.74	—29.23
6	West North Central	39,805	43,340	42,356	232,198	266,496	— 8.16	— 6.02	—12.87
7	West South Central	34,820	34,266	48,651	216,360	283,321	+ 1.62	—28.43	—23.63
8	Mountain	14,412	14,605	19,860	86,216	100,767	— 1.32	—27.43	—14.44
9	Pacific	46,485	45,619	57,284	275,910	352,732	+ 1.90	—18.85	—21.78
	Total—United States	410,607	423,484	517,043	2,368,359	3,070,875	— 3.06	—20.59	—22.88

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn. Zone 6—Iowa, Kan., Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo. Zone 9—Cal., Ore., Wash.

1958 TRUCK FACTORY SALES BY G.V.W.

As reported by the Automobile Manufacturers Association

Period	6,000 lb. and less	6,001-10,000 lb.	10,001-14,000 lb.	14,001-16,000 lb.	16,001-19,500 lb.	19,501-26,000 lb.	26,001-33,000 lb.	Over 33,000 lb.	Total
First Quarter	111,337	32,659	3,534	22,913	25,006	13,666	8,664	6,720	224,499
April	35,933	11,025	1,228	7,553	8,097	5,018	2,425	2,607	73,886
May	34,862	11,189	1,195	7,667	10,374	4,887	2,408	2,721	75,283
June	33,403	10,913	1,381	7,892	8,148	4,129	2,190	2,704	70,760
Total—6 Months 1958	215,535	65,786	7,338	46,025	51,625	27,680	15,687	14,752	444,428
Total—6 Months 1957	280,461	86,793	21,118	90,494	38,341	25,222	20,251	19,615	582,295

Rocket Engines and Nondestructive Testing

By Dr. R. P. Frohmberg

Chief, Production Development Laboratory

Rocketdyne, a Division of North American Aviation, Inc.

This Is the Second Part of a Two-Part Article. Part I Appeared in the July 15 Issue of AUTOMOTIVE INDUSTRIES, *page* 109.

Turbine Blades

The blades, or buckets, in a powerful gas turbine which pumps fuel and oxidizer into a rocket engine are similar in principle to jet engine turbines and compressors, and they are subjected to high and varied cyclic stress. This means that fatigue failure and the matter of surface quality is of greatest significance.

These blades are investment cast Stellite 21 alloy or vitallium. They are subjected to fluorescent penetrant and radiography in addition to visual examination, but it has been found, as with jet engine blades, that a simple visual examination at low magnification is by far the most critical test.

Gritblasted prior to receipt, one shipment looked pretty good. But hand polishing with metallographic paper brought to light a number of defects.

In examining some of these defects in detail, we found a number of lines which appeared to be scratches. These, of course, cannot be tolerated on turbine blades, and we had the problem of prescribing remedial action.

Were the scratches due to mishandling the finished blades, or mishandling the wax or plastic patterns; or were the scratches machining tool marks in the original pattern? These were vital questions because the answers determined whether we had to work with the Manufacturing Dept., the foundry, or a tool and die shop. Misdirected effort at this point could be very costly, and here again the nondestructive test engineer meets his challenge, for in addition to understanding the test, he must understand the process.

In another example we observed indications of defects which appeared due either to inadequate control over investment precoating or to dross present from melting, meaning that totally different types of remedial action were indicated.

Knowledge of Processing

If there are investment precoat problems and we alter the melting conditions, the result is lost time and money. A detailed study of a number of blades together with a knowledge of the foundry metallurgy of Stellite 21 is necessary to resolve the origin of the indications. (The statement that the casting is covered with warts or pimples is of little value to the foundry or the consumer in an attempt to produce a quality casting.) Again, a detailed knowledge of processing is necessary.

Inadequacy of Some Tests

It is necessary to recognize the inadequacy of certain surface tests in a case like this. Fluorescent penetrant tests, for example, may fail completely for large dross cavities. Those cases where the surface is masked also may not be revealed by surface penetrant tests. Radiography would be equally inadequate.

It is very easy to be lulled into a false feeling of security simply because a lot of money is spent on testing.

There is a strong temptation at this point to take advantage of the user of nondestructive tests since, in essence, he wants it that way. Again, we see another facet of the nondestructive testing engineer. He must be strong enough technically and morally so that he can step up to the challenge of this complex situation.

One of the most difficult things to overcome is the popular misconception that a hard-hitting quality control test-program is a luxury.

Reduced Costs

There have been many presentations of statistics to show that a reduction of costs can actually be made at the same time that quality is improved. We experienced the same thing in the improvement of the quality of investment cast turbine blades.

A plot of rejection rates and costs for turbine wheels from one supplier for a one-year period shows that rejection rates were reduced from a high of 34 per cent at the initiation of the program down to less than 10 per cent at the present time. Concurrent with this reduced rejection rate, the cost per unit was reduced to 20 per cent of the original cost.

One of the principal reasons for this marked improvement was a well-planned nondestructive testing and quality control program. But perhaps more important than the establishment of the program was the fact that a vigorous follow-up was maintained by both the nondestructive testing personnel and the supplier.

Brazed Parts

Another example relates to a pump diffuser vane made up of two pieces. The two parts are rough machined, then dip or furnace brazed into position. It was discovered by visual examination that the brazed joint appeared to be of questionable quality, and investigation revealed that the part had been radiographed as required.

It appeared then that the part had successfully passed a powerful nondestructive test and, hence, the part should be satisfactory.

What someone failed to realize was that the brazed joint was 0.003 to 0.005 in. thick and the entire section is 1½ in. in thickness so that a sensitivity of 0.2 to 0.3 per cent would be required to pick up discontinuities in the brazed joint. A sensitivity of this sort is outside of the realm of anything in commercial practice.

In this case again, a careful visual examination goes a long way toward telling us whether the joint

(*Turn to page* 118, *please*)

SUSPENSION *Problem?*

Warming up a "red hot pitcher" and reaching for those wide ones can sure develop "suspension" problems. Something is bound to pop if there is a weak point.

Elimination of weak points which could cause costly failures is a specialty of Burton Spring engineers. The tortuous conditions imposed by heavy loads and high speeds are being met successfully by combining time-tested advantages of steel springs with new developments in their design and engineering. Proper load balance, controlled sidesway and rebound, positive alignment, and structural strength are achieved with today's springs by Burton.

Your suspension problems will find best solution through Burton experience in this specialized field of engineering. Your inquiry is invited.

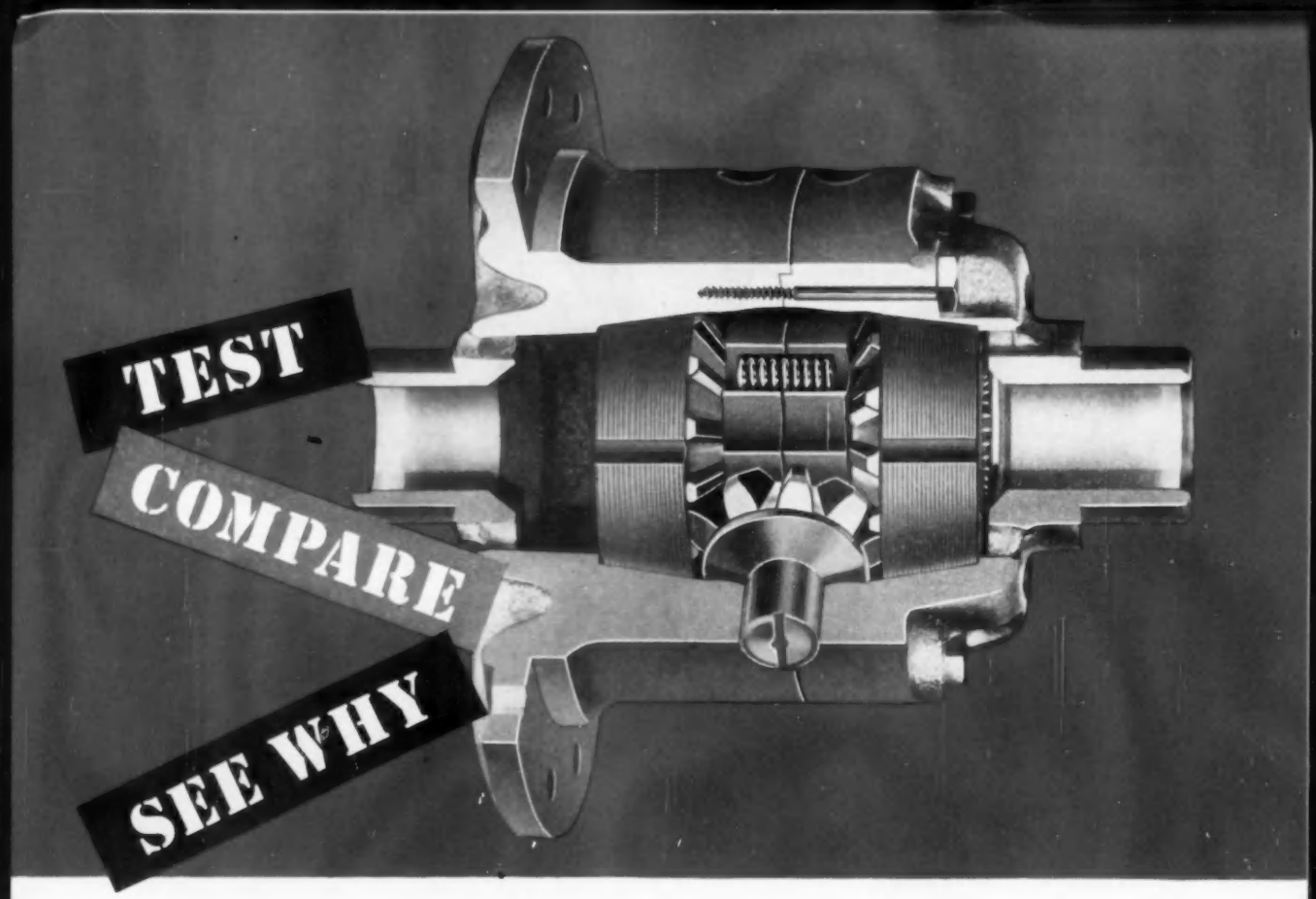
BURTON

AUTO SPRING CORP.

Vital Support for the Automotive Industry

WESTERN AVENUE AT FORTY-EIGHTH STREET
CHICAGO 32, ILLINOIS

Trucks, buses, trailers, off-highway equipment, and private motor cars of almost every prominent make use Burton Leaf or Coil springs as original equipment.



WARNER SPIN-RESISTANT DIFFERENTIAL

Gives Superior Performance

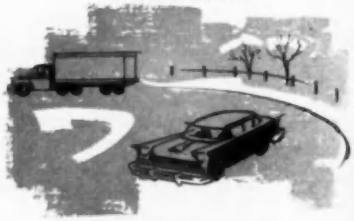
No matter what the weather or road condition—rain, snow, ice, sand, gravel, mud—the new Warner Spin-Resistant Differential keeps cars on the go. With power automatically transferred to the wheel with the greater traction, *pre-loaded* cone brakes and side gear thrust smoothly brake the other wheel.

That virtually eliminates wheel spin, greatly reduces dangerous skids and swerves, ends tire scuffing from wheel bounce. And that means sure-footed driving for cars, trucks, fork lifts and other vehicles.

Equally important is what the Warner Spin-Resistant Differential WON'T do. It *won't* become noisy, *won't* cause full locking of either axle shaft, *won't* interfere with normal steering, *won't* develop excessive backlash.

That all adds up to better, more dependable performance, greater user satisfaction. Why not see for yourself. Write, wire or telephone for full information.

Retards wheel spin for better traction



Reduces skidding, swerving

Ends tire scuffing from wheel hop

See our Displays at Milwaukee Auditorium, Rooms 1-2-3—Sept. 8-11.

WARNER AUTOMOTIVE

Warner Automotive Division, Borg-Warner Corporation

AUBURN, INDIANA

Unusually Tough BOLTS!

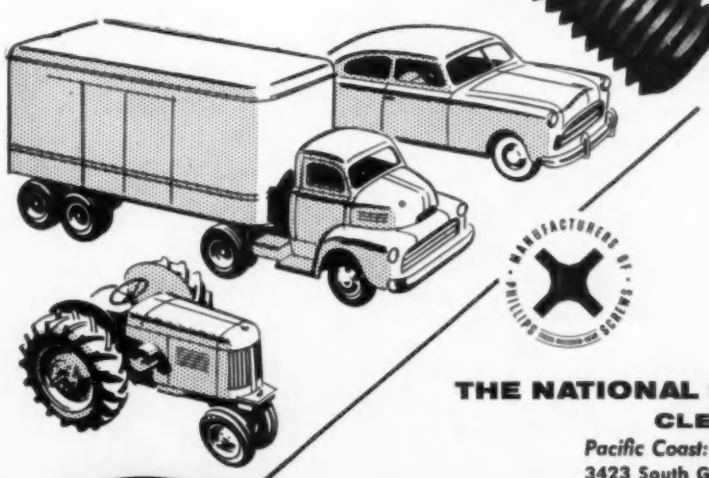
As vital parts of tractors, dirt movers and other heavy-duty equipment, these big bolts can take a terrific beating and still hold fast. They will resist shear, fatigue and impact that no common bolts could withstand without wear or breakage. Special heat-treatment produces this unusual toughness, making these National bolts capable of enduring extremely severe stresses.

By cold heading and special production methods, National can turn out many special headed-and-threaded fasteners which, like these bolts, solve special problems or reduce costs. Depend on National's extensive manufacturing facilities and complete line of fasteners for your needs.

Write for a free copy of National's "Special" fastener booklet.

Representatives in:

Chicago	Indianapolis	Philadelphia
Cincinnati	Kansas City, Mo.	Portland
Dallas	Lansing	Rochester
Denver	Milwaukee	San Francisco
Detroit	Minneapolis	St. Louis
	New York	



MANUFACTURERS OF PHILLIPS SCREWS

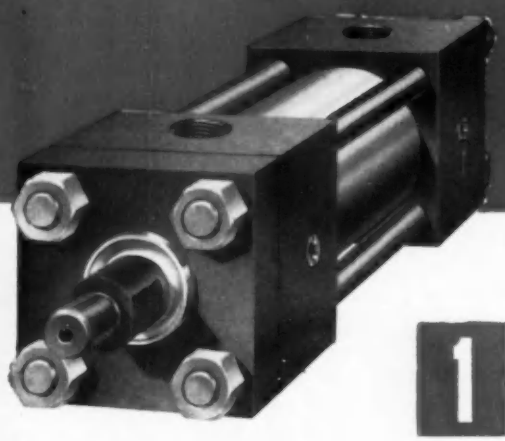
THE NATIONAL SCREW & MFG. COMPANY
CLEVELAND 4, OHIO
Pacific Coast: National Screw & Mfg. Co. of Cal.
3423 South Garfield Ave., Los Angeles 22, Cal.

National PRODUCTS

Fasteners Hodell Chains Chester Hoists

SEAL FAILURE MEANS CYLINDER FAILURE

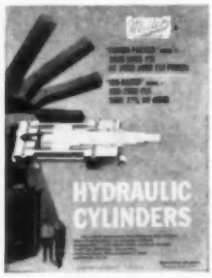
Petroleum base, fire-resistant and special hydraulic fluids cause distortion and rapid deterioration of the seals currently used in many hydraulic cylinders, resulting in costly repairs and cylinder failure. (Seals made of synthetic rubber are not compatible with even 50% of available commercial petroleum base fluids and the life of such seals is materially reduced at operating temperatures above 150° F.)



Specify Miller HYDRAULIC CYLINDERS

FOR UNLIMITED SEAL LIFE!

Request Bulletin JH-104N for complete data plus helpful charts on column strength, cylinder forces, factors of safety, acceleration, pipe pressure losses, etc.



1 ALL TEFLON* SEALED Against External Leakage

TEFLON is impervious to all known hydraulic fluids, including all fire-resistant and special types – and withstands temperatures from —100°F. to plus 450°F.

TEFLON SHEF SEAL AT TUBING ENDS

No blind assembly. Is

Shear-proof
Heat-proof
Extrusion-proof
Fluid-proof

TEFLON SEALS ON PISTON ROD AND BUSHING

Teflon rod flange seal requires no adjustment. Teflon bushing seal is shearproof. Teflon wiper keeps dirt out.

TEFLON SEALS ON BALL CHECK AND ADJUSTING SCREW

Non-protruding, self-locking, cushion adjusting screw interchangeable with ball check for easy access.

2 CASE-HARDENED CHROME PLATED PISTON RODS

Provide foolproof protection against seal failures resulting from rod damage. The Miller case-hardened rods (50-54 Rockwell C) give practically complete immunity to damage from hammer blows, wrench-dropping, mishandling, etc. The hard chrome plating over the case-hardened rods protects against scratch-damage and rust.

AVAILABLE IN TWO TOP QUALITY LINES

JOB-RATED
Model "J"

PRICE SAVINGS OF 27% OR MORE!

19 mounting styles, all strokes, cushioned and non-cushioned. Large selection for immediate shipment.

BORE	SEVERE OPERATING CONDITIONS	MODERATE OPERATING CONDITIONS	YOU SAVE THIS % IN PRICE OVER STANDARD 2000-3000 PSI CYLINDERS
1½"	1500 PSI	2500 PSI	27%
2	1500	2500	27%
2½	1000	1500	28%
3¼	1500	2500	32%
4	1000	1500	35%
5	800	1200	37%
6	800	1200	43%
8	500	800	50%
10	500	800	71%
12	500	800	76%
14	500	800	*Not Available in 2000-3000 PSI*

POWER-PACKED
Model "H"

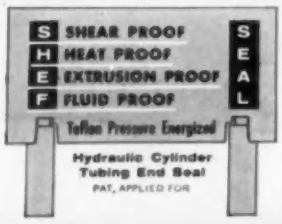
50% More Power Per Cylinder Dollar!

For

3,000-5,000 P.S.I.

1½" through 12" bores, 17 mounting styles, strokes up to 22 ft., cushioned and non-cushioned. Large selection for immediate delivery.

*DuPont trademark for its tetrafluoroethyline resin



OTHER MILLER QUALITY FEATURES

- Solid Steel Heads, Caps and Mountings.
- Precision-Honed Barrels.
- Rust-Resistant Coating on All Non-Wearing Surfaces.
- Space-Saving "Square" Design.

MILLER FLUID POWER
DIVISION OF FLICK-REEDY CORPORATION

2028 N. Hawthorne Ave., Melrose Park, Illinois

AIR AND HYDRAULIC CYLINDERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS • BOOSTERS

Free INFORMATION SERVICE

Use either of these postcards for Free Literature listed below, or for more information on New Production Equipment and New Products described in this issue.

USE THIS POSTCARD

FREE LITERATURE

Bar Automatic 1

Bulletin MRA-58, eight pages, covers the Acme-Gridley multiple spindle bar automatic, the 7/16 in. RA-6. The bulletin lists construction features, accessory attachments for threading and tapping, high speed drilling, pick-off and back finishing and accelerated reaming. *The National Acme Co.*

Fluid Power Motors 2

Engineering data on fluid power motors, pumps, valves, and cylinders has been published in four page Bulletin 100-P3 prepared by the *Commercial Shearing & Stamping Co.*

Forming Dies 3

Forming dies and other castings of Strenes metal for the automotive industry are featured and illustrated in an eight page catalog available from *The Advance Foundry Co.*

Electrical Terminals 4

A catalog on continuous strip electrical terminals and attaching machines is available from the *Kent Mfg. Corp.*

Flexible Hose 5

Folder SSDS-562, four pages, features Allflex stainless steel hose which can handle pressures up to 4000 psi, temperatures through 1500 F. *Allied Metal Hose Co.*

Semi-Automatic Welder 6

The Colmonoy semi-automatic welder is described in a two page brochure which points out construction features and lists a wide range of applications for the machine. *Wall Colmonoy Corp.*

External Cotters 7

Fifteen standard external cotters are described in a data sheet published by the *Hunter Spring Co.*

Industrial Lubricants 8

Bulletin BK-190a provides a pretested, pre-established list of lubricants for a number of specific types of equipment operating under normal conditions of speed and temperature. *Keystone Lubricating Co.*

Circuit Breakers 9

Bulletin GEA-5915, 20 pages, offers a detailed description on the operation and application of AK-2 low voltage power circuit breakers for circuits up to 600 vac and 250 vdc. *General Electric Co.*

Power Supplies 10

Bulletin 2050, available from Electric Regulator Corp., describes Series 2.050 Regohm-controlled precision power supplies. A schematic diagram, typical performance curves, and ordering information included.

(Please turn page)

VOID After Oct. 15, 1958 **8/15/58**

Circle code numbers below for Free Literature, New Plant Equipment, or New Product Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
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Permit No. 36
New York, N. Y.

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AUTOMOTIVE INDUSTRIES
P. O. Box 66,
Village Station,
New York 14, N. Y.

Readers Service Dept.

Flame Cutting Machine 11

Form ADC 673, eight pages, details the features of Airco's radiograph flame cutting machine which is a portable, motor driven, straight-line track-guided machine for limited contour, circular, and curved cutting. *Air Reduction Sales Co.*

Industrial Casters 12

Catalog 59, 44 pages, covers the Albion Industries line of industrial casters and wheels. Suggested uses, mounting dimensions, capacity ratings, etc. included. *Albion Industries, Inc.*

Universal Joints 13

Industrial Couplings is the title of a 16-page catalog which features a complete guide to the selection of many types of universal joint drives used in agricultural, industrial, and marine applications. *Standard Equipment Div. of Dana Corp.*

Floor Trucks 14

Circular 29-D aids in the selection of 4-wheel floor trucks for a wide variety of special and standard materials handling jobs. *Lewis-Shepard Products, Inc.*

Welder Control 15

Bulletin 10-613 describes the Taylor-Winfield counting tube type of precision control for tri-phase electric resistance spot-welders. *Taylor-Winfield Corp.*

USE THIS POSTCARD

Hydraulic Press Brakes 16

Catalog 2024A covers the line of Steelweld hydraulic press brakes which feature positive overload protection, ram reversible at any point, stroke adjustment for any length, fast ram approach and return with slow-speed pressing and constant power during the entire stroke. *The Cleveland Crane & Engineering Co.*

Honing Machines 17

Four honing machines, two honing heads which are adaptable to drill presses, mandrel driver, mandrels and abrasive stones are fully described in a 30 page catalog prepared by the *Superior Hone Corp.*

Environmental Testing 18

A brochure describing and illustrating the facilities of the Environmental Testing Div. at *Bowser-Morner Testing Laboratories, Inc.* is now available.

Roller Bearings 19

Sonnet roller bearings for milling machine outboard supports are featured in a four page catalog. Bearing sizes and dimensions for popular make milling machines are included. *Sonnet Tool & Mfg. Co.*

Clamping Tools 20

Catalog 114 contains complete application, construction, specification and price data on over 400 items in the clamping tool category. *Wilton Tool Mfg. Co.*

Electric Ovens 21

Catalog 158, 200 pages, describes a line of electric ovens, furnaces, baths, environmental cabinets, related temperature control equipment and accessories for laboratory, pilot plant and production. *Blue M Electric Co.*

Hydraulic Pumps 22

A six page folder features 10 to 500 series air-operated hydraulic pumps. The pumps are available in nine sizes, capable of producing from 500 to 25,000 psi hydraulic pressure from a maximum of 100 psi air pressure. *SC Hydraulic Engineering Corp.*

Forgings

Twenty pages of forging data and information covering everything from proper die design through forging methods, trimming, cleaning and inspection are contained in Catalog F-1. Address request on company letterhead to *Merrel Brothers, Caspian Street, Maspeth, N. Y.*

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FIRST CLASS
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AUTOMOTIVE INDUSTRIES
P. O. Box 66,
Village Station,
New York 14, N. Y.

Readers Service Dept.

New Holley '59 Carburetors can be serviced in minutes— WHILE ON THE ENGINE!

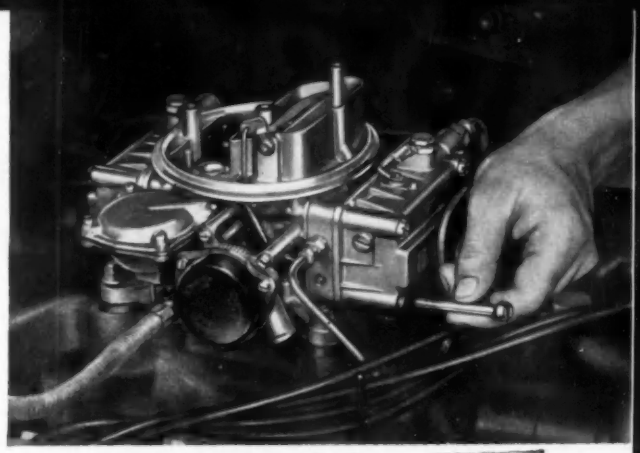
Many 1959 automobiles and trucks will be equipped with newly designed Holley two and four barrel carburetors that have a special needle and seat assembly which makes carburetor service a matter of minutes.

All carburetor minor repair—90% of carburetor service requirements under 30,000 miles—can be completed in the time it takes to remove and replace a single spark plug; and, without removing the carburetor from the engine.

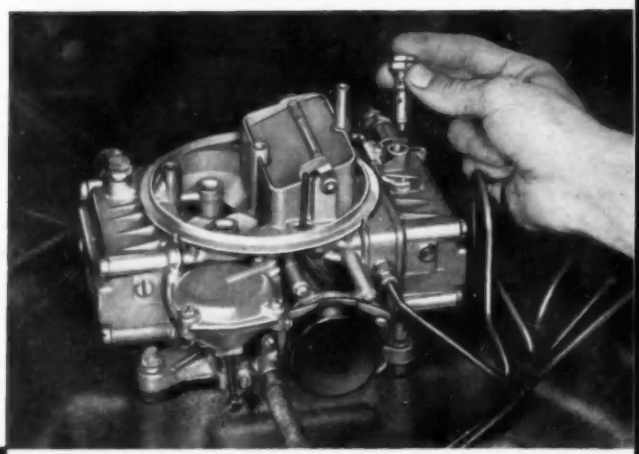
These Holley 1959 models will substantially reduce customer service complaints and will make minor repair work more profitable and more accurate for the service man. With just the four simple steps shown on this page service men can:

1. Purge the carburetor of dirt and foreign matter.
2. Accurately adjust the fuel level in the bowl.
3. Replace or adjust the fuel inlet needle and seat.

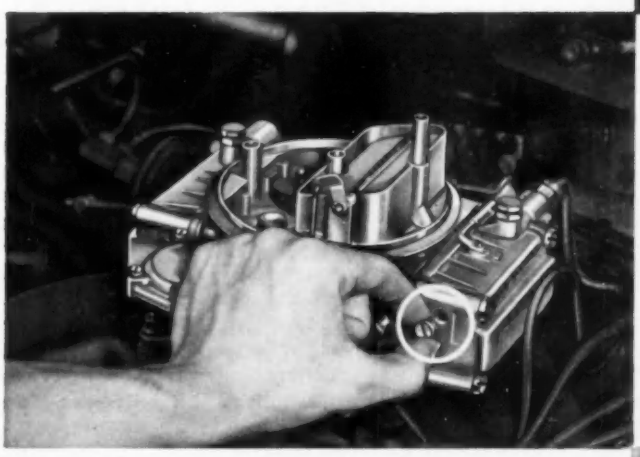
These new 1959 carburetors are another example of Holley's continuing leadership in the design and engineering of fuel and ignition equipment.



1 *With ignition off, remove lower bowl screw farthest from fuel inlet. Allow all gasoline to drain, purging the carburetor of dirt and sludge.*

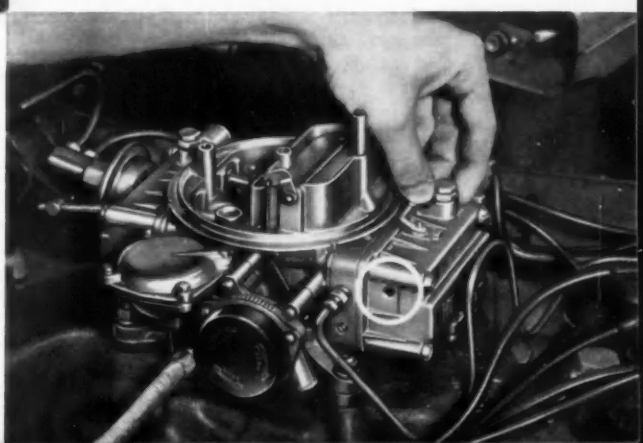


2 *Remove fuel needle and seat and examine for wear and general condition. Replacement can be made at low cost although there should be no evidence of wear until after 20,000 miles.*



3 *With engine running, remove sight plug from carburetor bowl opposite fuel inlet. If fuel level is too high, excessive fuel will drain through sight plug opening. For proper operation, fuel level should be on line with threads at bottom of sight port.*

4 *Loosen top lock nut on needle and seat assembly and adjust with lower nut until float maintains fuel at desired level. Tighten lock nut and minor repair is completed.*



HOLLEY Carburetor Co.

For more than half-a-century — original equipment manufacturers for the automotive industry

11955 E. NINE MILE ROAD • WARREN, MICHIGAN

I-29

News of the MACHINERY INDUSTRIES

By Charles A. Weinert

Orders for Cutting Type Machine Tools During First Six Months of Year Totaled $139.85 Million. June Shipments Amounted to $35.3 Million

Six Months' Sales of Machine Tools

According to latest figures released by the National Machine Tool Builders' Assn., the dollar volume of net new orders for cutting-type machine tools during the first six months of 1958 totaled $139.85 million. It was the lowest first-half volume since pre-Korea 1949, when bookings amounted to $124.6 million. Comparative figure for the first half of 1957 is $316.15 million.

June net new orders increased seven per cent over May, to $23.5 million—slightly higher than the 1958 monthly average of $23.31 million.

Shipments of metal-cutting-type machine tools in the six-month period totaled $245.2 million, compared to $492.6 million in 1957's first half. June shipments amounted to $35.3 million.

Backlog of orders on hand as of July 1 was estimated at 2.6 months.

Metal-forming-type machine tools were ordered at a rate 48 per cent higher in June than in May—$9.1 million versus $6.15 million. Total six-months' net new orders totaled $40.4 million.

Shipments in June were valued at $10.1 million—about average in the six-months' total of $61.2 million. Backlog as of July 1 was estimated at 2.2 months.

Metal-cutting and metal-forming types, combined, totaled $180.25 million in net new orders, and $306.4 million in shipments during the first half of 1958.

Machine Tool Salesmen Get Schooling in Basics

"Pedigreed selling" was one of the terms used at this year's Machine Tool Sales Conference to define the program's aim. In essence, the project was a basic refresher course for machine tool sales representatives, as well as a training course for new sales personnel.

Held at Purdue University during the full week of July 28 to August 1, the annual summer conference had a "student body" of 106 from machine tool builders and distributors in 18 states. As heretofore, the National Machine Tool Builders' Association and the American Machine Tool Distributors' Association were joint sponsors.

Its objective? How to more intelligently and more effectively sell machine tools—and how to best serve the customer by showing him how he can reduce the cost of making his product.

Why inaugurated? Because the business of selling machine tools is a highly skilled profession requiring technical and financial know-how, in addition to the many other primary sales assets. The buyer expects the machine tool salesman to be a sales engineer able to size up the job and engineer the right equipment to get the job done at the lowest cost per unit of work. The salesman should be up to date on the technology of his own product, the industry, and on new and improved methods of solving specific problems. And, at the same time, he must be able to make a complete and attractive presentation of the facts.

The salesman was termed to be an "investment salesman." The customer's job is to equip his plant with good modern cost-saving machine tools. Changes are coming fast, and it is uneconomical for the customer not to replace obsolete equipment. The salesman should help the customer do the customer's job—by showing the customer what it costs to not replace an old machine. Remember, the main appeal in selling machine tools is economics—a case of giving adequate value for value received. Creative selling is not easy for the salesman—even though the customer can reap benefits for himself by consulting the salesman and utilizing the latter's experience and knowledge. But here is a major challenge to the salesman—and one where the largest market lies.

These were some of the things which various members of the "faculty" reminded the "students."

The educational program was guided by 35 industry executives and college professors, all well versed in, and specialists in, their respective fields.

The "curriculum" covered literally all the facets of machine tool selling. Subjects, among others, discussed in detail were: What the buyer wants, analyzing your own and customers' personalities, managing your territory, originating the inquiry, information needed to quote, and the sales presentation. Also, tools for selling, the economics of machine tool replacement, follow through after the order, financing the sale, and the legal aspects of selling.

This was the 13th such sales conference, the first of which was held during 1948. Colleges and universities have been the appropriate settings, the sessions having previously been at Cornell, Purdue, Western Reserve, and Dartmouth.

As the training program has evolved over the years, many refinements and additions have been incorporated. All agree that this year's program was tops—excellently organized and presented.

Government Warehousing on the Increase?

Congress has been asked to vote another $3.5 million for the warehousing of Government-owned machine tools in the next 12 months.

The request from General Services Administration, however, hasn't been well received. There is some feeling that public funds are being used to store and inspect many tools which could have been disposed of years ago.

At the latest count, the National Industrial Equipment Reserve operated by GSA contained 4741 items, from a cumulative total of items brought in of 39,436. The remainder is accounted for by 26,457 disposed of and 8238 transferred to the military.

Over the past 10 years the reserve program has cost close to $4.8 million. GSA originally asked Congress for $503,600 to cover the costs in the year that began July 1. Now the agency bids for another $3.5 million, raising its request for the year to $4 million.

Major items within the $3.5 million desired are $1.3 million for dehumidification, $620,000 for building repairs, $707,300 for transportation, $375,000 for material-handling equipment, and $277,800 for wages of a greater number of workers to process and test the tools received.

Of the storage space to be dehumidified, 500,000 sq ft will be at the proposed new center at Jeffersonville, Ind. The remaining 388,610 sq ft are at present sites in Burlington, N. J. and Dixon, Ill.

Some 12,000 tools are expected to come out of military contractors' plants this year and for each of the next two years. Based on past experience, the number of these tools which appear to be headed into the equipment reserve is 5000 per year.

More on Depreciation

The Tax Depreciation Problem is the title of a 23-page pamphlet published by MAPI and authored by George Terborgh. It presents a discussion of the deficiency of historical-cost accruals caused by inflation, as related to tax depreciation.

The study concludes that now is the time for a further liberalization of tax depreciation policy on a permanent basis—as an offset to the present deficiency of historical-cost allowances, and also as a means of promoting the growth of American economy.

If the liberalization does not take the form of an adjustment of depreciation to its current-dollar equivalent, then it should take the form of a compensatory speed-up of the historical-cost allowances themselves, the study found.

It adds that the history of inflation in this country over the past quarter century indicates that such a speed-up would have required a declining-balance writeoff between three and four times the straight-line rate. Suggested is at least a triple declining-balance writeoff—or, alternatively, an initial allowance of the British type sufficient, with a double-rate writeoff, to accomplish a like result.

A program of immediate consideration by Government of this highly important matter, with a view to legislative and administrative implementation, is advocated.

Copies of the new publication are available from the Machinery and Allied Products Institute, 1200 Eighteenth St., N.W., Washington 5, D.C. Price is $1.00 each.

More Government Contract Awards

LATEST contracts awarded by various Government agencies, and covering primarily automotive and aviation products, are listed in the following. Typical of the items contained in these monthly listings are:

AEROPHYSICS DEVELOPMENT, Santa Barbara, Calif.
Dart, antitank, guided missile—$49,896

AINSWORTH PRECISION DIV., HARSCO CORP., Detroit, Mich.
Automotive spare parts replenishment—various quantities—$52,471

AUTOMATIC TRANSPORTATION CO. DIV., YALE & TOWNE MFG. CO., Chicago, Ill.
Trucks—6 ea—$24,012

ANDERSON, O. L., CO., INC., Detroit, Mich.
Automotive spare parts—various quantities—$184,012

BENDIX AVIATION CORP., North Hollywood, Calif.
Spare parts for C119 and C124 aircraft—$66,697

BENDIX AVIATION CORP., South Bend, Ind.
Spare parts for C121, B36, C124, C47, C117, F84, F94, SA16, B50, KC97 and B66 aircraft—$91,954

CANFIELD TOOL & DIE CO., Van Dyke, Mich.
Automotive spare parts, replenishment—6056 ea—$133,111

CHEVROLET MOTOR DIV., GMC, Detroit, Mich.
Automobiles & station wagons—2922 ea—$4,922,960

CHEVROLET MOTOR DIV., GMC, Detroit, Mich.
Truck, cargo (Pickup) and Panel—128 ea—$619,641
Truck, chassis, ¾ ton, conventional, 4x2—526 ea—$713,298
Truck, sedan delivery—13 ea—$25,399
Truck, dump, 2½ ton, 4x2—240 ea—$722,839
Truck, pickup, ½ ton, 1702 ea; Truck, panel, ½ ton—385 ea—$2,644,996
Truck, air conditioned van type—4 ea—$25,644
1½ ton truck, stake & platform—9 ea—10,898
Trucks—12 ea—$41,543

CHEVROLET MOTOR DIV, GMC, Washington, D. C.
Trucks—5 ea—$16,607

CHRYSLER MOTORS CORP., Detroit, Mich.
Automobile, sedan, medium—18 ea—$49,362

CHRYSLER MOTORS CORP., Detroit, Mich.
Truck, Maint. and Const. Elec. Line, 12 ea; Truck, Cargo, 3 ton, 4x2—15 ea; Truck, Stake, Conventional, 3 ton—23 ea—$198,944
Truck, stake, platform, 5 ton—2 ea; Truck, tractor, 5 ton—70 ea—$289,662

CHRYSLER MOTORS CORP., Washington, D. C.
Automobiles & station wagons—1165 ea—$1,523,135

CHRYSLER MOTOR CORP., Washington, D. C.
Station wagons & light trucks—1148 ea—$1,416,214
Sedans, station wagons & trucks—11 ea—$18,234

CHRYSLER MOTOR CORP., Washington, D. C.
Trucks—2535 ea—$5,623,733
Light trucks—199 ea—$287,754

CINCINNATI MILLING AND GRINDING MACHINES, INC., Cincinnati, Ohio
Milling machine—2 ea—$34,548
Grinder, cylindrical—1 lot—$38,806
Machine, milling, vertical—1 lot—$107,070

CINROCK MACHINERY INC., Clifton, N J.
Grinder, jig, with slot grinding attachment—1 lot—$51,130

CLARK EQUIPMENT CO., Buchanan, Mich.
Truck, fork lift, gasoline powered, solid rubber tires, 4000 lb cap., without radio interference suppression—140 ea—same except with overhead safety guard—260 ea—Truck, fork lift, gas powered, pneumatic rubber tires; 2000 lb cap—3 ea—same except overhead safety guard, dual drive front wheels, 4000 lb cap—15 ea—$1,388,175
Truck, lift, fork, 4000 lb cap—30 ea; Truck same except 6000 lb cap; Spare parts for trucks—2 sets—$143,426

(Turn to page 82, please)

NEW PRODUCTION and PLANT EQUIPMENT

*FOR ADDITIONAL INFORMATION, please use reply card on PAGE 73

Copying Lathe

ON the 412/25 multiple spindle copying lathe the work is chucked between centers and then both the driving spindles and tailstock centers index together through the work positions.

Copy turning is performed by template operated hydraulic copying slides which can be mounted at the three work stations. For additional operations, forming arms and/or cross slides can be mounted at the same work stations. An infeed or necking slide can be added at the number one or at the loading station.

Because all operations are performed with the work mounted between the same set of centers, concentricity of all diameters is maintained. *New Britain Machine Co.*

Circle 30 on postcard for more data

Read-Out Instrument

DIGITAL read-out from any transducer using bonded or unbonded strain gages can be made by use of this servo null-balance instrument. Named the Model UDTI-2, it has a basic indicator accuracy of ±0.15 per cent of full scale range.

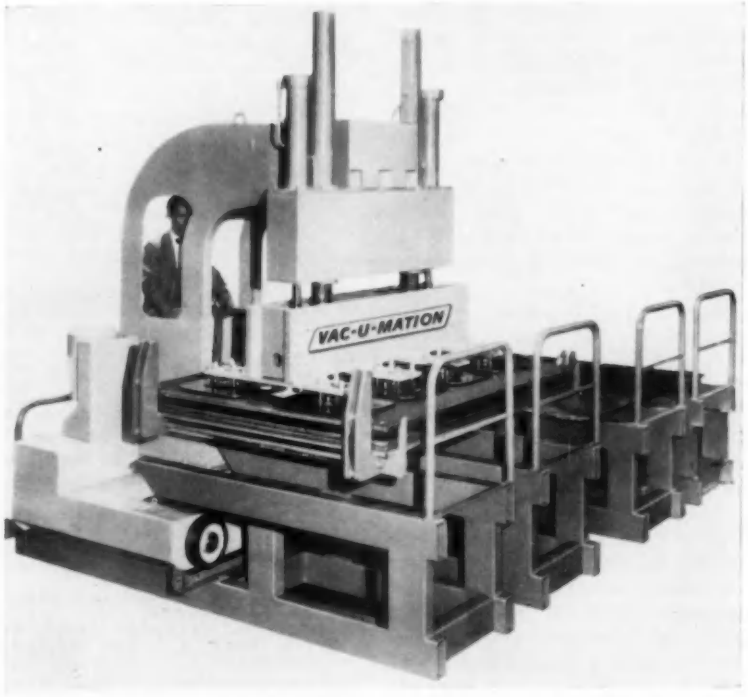
In multiple-transducer installations,

Performance universal strain gage indicator

the indicator can read all of the transducer outputs over a wide range, 1 to 5 mv per volt.

The UDTI-2 is housed in a portable steel cabinet, 8 by 12½ by 13 in. and has a roll-out chassis. An adapter flange is available so the unit may be mounted in a 19 in. relay rack. *Performance Measurements Co.*

Circle 31 on postcard for more data



Vac-U-Mation plate lifter and feeder lifts plate loads from 2000 to 10,000 lb

Combination Vacuum Plate Lifter And Feeder

A COMBINATION vacuum plate lifter and feeder will lift and move single or multiple plate loads from 2000 to 10,000 lb by means of vacuum alone. It can be supplied with extension arms making it possible to lift and move heavy plates 10 ft wide by 40 ft long, weighing 10,000 lb or more. The unit rides on rails and can be made semi-automatic with remote controls.

The vacuum is produced by two vacuum pumps each powered with a ½ hp motor. Failure of one pump would in no way affect operation, as one pump can hold the load. *Vac-U-Mation Div., F. J. Littell Machine Co.*

Circle 32 on postcard for more data

Utility Fastener

DESIGNATED the C6L Utility Huckbolt Fastener, a new fastener design is recommended for joining wood, metal, rubber, plastic, honeycomb and other materials which are difficult to fasten together. It is available in various nominal pin diameters and in all head styles for metal-to-metal application. *Huck Mfg. Co.*

Circle 33 on postcard for more data

Chemical Milling Basket

MADE of Haynes alloy No. 25, a line of special baskets has been designed to carry parts into an acid tank and are able to withstand repeated immersions in the etchant acids used in chemical milling. These baskets are for use with stainless steel or titanium. *Haynes Stellite Co., Div. of Union Carbide Corp.*

Circle 34 on postcard for more data

Tapping Attachment

TAPMATIC tapping attachment models 400, 600 and 800 are designed for use on machines with reversing spindles, such as lathes, turret lathes, radials, jig borers and screw machines.

Operating on the weightless tapping principle, they have a floating axial movement which eliminates the necessity of lead pressure by the operator during the tapping cycle.

The rated capacities are: model 400, from 0 to 5/16 in., model 600, from No. 10 to ⅝ in. and model 800, from 9/16 to 1 in. *Tapmatic Corp.*

Circle 41 on postcard for more data

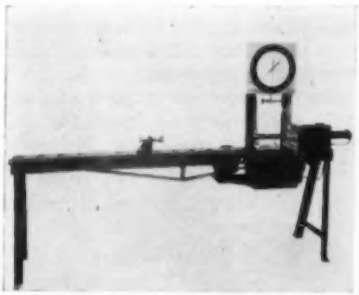
Holding Fixture

A DUAL chucking, cylinder operated holding fixture has been developed for use on high output automated production equipment. Designed to be used individually or mounted in groups on a rotating work table and to provide simultaneous chucking of two identical parts, the fixture features clamping jaws set at a 45 degree angle to permit both horizontal and vertical machining of the workpiece without rechucking. *The S-P Mfg. Corp.*

Circle 42 on postcard for more data

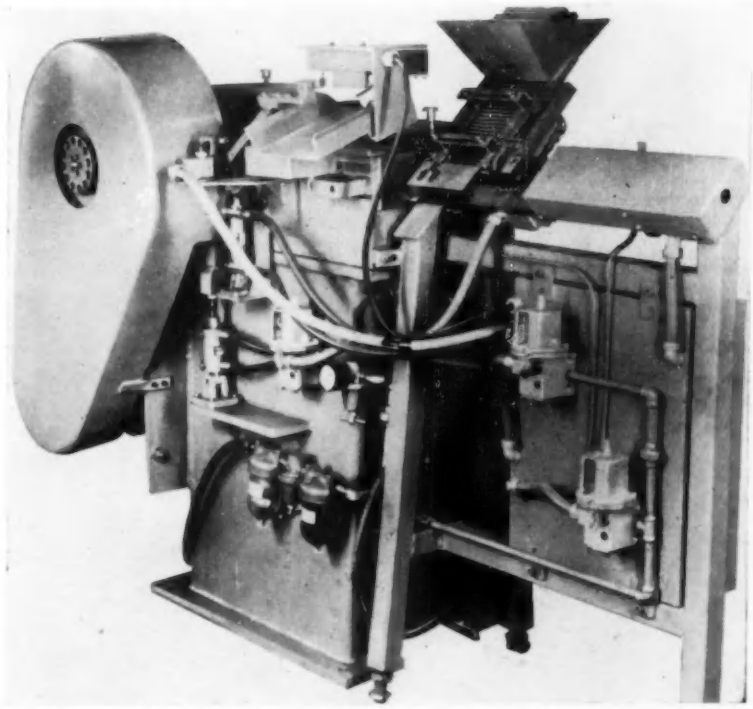
Horizontal Brinell Tester

THIS Brinell testing machine, for production testing of flange members on long shafts, such as axle assemblies, carries two dials. One shows load applied and the other is a direct reading dial for comparative checking. It uses hand-set high and low limit indicating needles. The anvil and testing ball may be interchanged to allow test impressions to be made on either side of the part. *Detroit Testing Machine Co.*



Detroit production horizontal tester

Circle 43 on postcard for more data



Automation Associates air-operated parts loader and unloader automates flaring machine

Air-Operated Parts Loader and Unloader

USED in conjunction with the Model B-2 high-speed double flaring machine this air-operated, electrically controlled parts loader and unloader will produce over 2400 double-flares per hour.

The loader and unloader were developed to handle tubes from 3/16 to ½ in. OD and from 2¼ to 7¼ in. long. It is free-standing and may easily be moved to one side for hand feeding of longer tubes. Air consumption rate is about ½ cfh at 30 psi at 2400 pieces per hour. Weight, about 210 lb. *Automation Associates, Inc.*

Circle 44 on postcard for more data

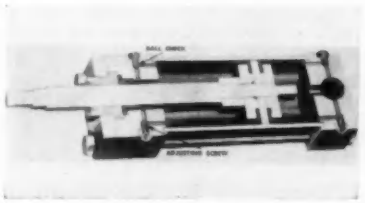
High Temperature Furnace

FOR use at temperatures up to 4600 F, this laboratory size furnace was built for sintering ceramic materials and can be adapted to crucible melting with tilt pouring, high-temperature material testing, and other laboratory requirements for high temperatures. Fuel is oxygen-acetylene. The unit has a skin temperature of less than 200 F when operating at 4600 F, thus, it can be used in most any laboratory surroundings. *The Zirconium Corp. of America.*

Circle 45 on postcard for more data

Cushioned Air Cylinders

A LINE of cushioned air cylinders feature a non-protruding, self-locking cushion adjusting screw which allows for fast cushion adjustment and mounting versatility.



Miller air cylinder with non-protruding, self-locking cushion adusting screw

No parts of the adjusting screw and ball check assemblies protrude beyond the flat, side-mounting surfaces of the cylinder head or cap so that the cylinder can be mounted on the side containing the adjusting screw assembly, if desired. *Miller Fluid Power Div., Flick-Reedy Corp.*

Circle 46 on postcard for more data

NEW PRODUCTION and PLANT EQUIPMENT

Magnaflux re-engineered magnetic particle inspection machine, Model MQ-242

Magnetic Particle Testing Unit For Small Ferrous Parts

PRODUCTION testing of small ferrous parts can be accomplished with this re-engineered testing unit. The machine, named the NQ-242, employs the wet magnetic particle inspection method, either visible or fluorescent.

Inspection is performed by placing the part between the heads or in the coil. As the magnetizing current is actuated, the part is flooded with a solution containing fine magnetic particles, either visible or fluorescent. The particles accumulate along the flaw, if any, marking defective areas. Black light reveals the particles as glowing indications.

The unit operates from 220/440 v, 50/60 cycle, 3 phase current. Dimensions are 56 in. wide, 24 in. deep and 6 ft-7 in. high. *Magnaflux Corp.*

Circle 35 on postcard for more data

Bar Stock Cleaning Unit

A LINE of special cabinets designed for descaling wire rod and bar stock enable blast cleaning and cold drawing, cold heading, or patenting to be automated into one continuous operation. There are a variety of machine designs available capable of handling single strands at speeds up to 600 fpm. Up to 18 strands can be cleaned in a single cabinet following patenting furnaces. *The Wheelabrator Corp.*

Circle 38 on postcard for more data

Power Deburring Tool

BURRWEL 85 is a power tool that deburrs and chamfers all kinds of materials. It makes a quick, easy, fast cut from 0 to 1/16 in. in any metal, nylon, hard rubber or plastic.

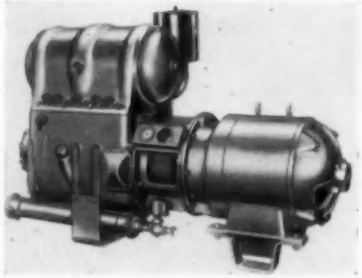
The unit weighs 5 lb and is powered by a 1/10 hp, single phase, 115 v motor. It can be used as a stationary tool clamped to any bench vise or can be taken to the work. Equipped with a "V" guide, it is applied to the edge of the workpiece to give a 45 degree angle cut from 0 to 1/16 in. by means of adjusting screws. *Sigwell Corp.*

Circle 39 on postcard for more data

Heavy Duty Compressor

DESIGNED for continuous operation at 100 psi, this 100 hp heavy duty Hydrovane rotary industrial compressor delivers 420 cfm at that pressure. It is also suited for intermittent use at pressures to 125 psi.

The unit occupies 15 sq-ft of floor space and requires no special foundations. Only a small three inch outlet is needed. Discharge air temperature is 180 degrees. Automatic safety switch and time meter are standard equipment. *Davey Compressor Co.*



Hydrovane rotary industrial compressor

Circle 40 on postcard for more data

Precision Boring Head

THE ABC Mark 11 boring head is a precision tool with a capacity range from ⅜ to 5 in. Rough settings are made by swiveling the tool bit. Fine adjustments are handled by a micrometer slide reading in 0.001 in. The head is 2¼ in. in diameter and 2 in. in length. Because of small offset, the head stays closely balanced and may be operated at high speeds. It may be used on lathes, milling machines or drill presses. *Production Equipment Co.*

Circle 36 on postcard for more data

Dial Snap Gage

BOICE Gages, Inc., is offering a precise dial snap gage which employs the use of a reed linkage transfer. Five models cover the range from 0 to 8 in. Some of the features of the gages include carbide faced anvils, adjustable backstops, stainless steel bushings in the lower anvil and the indicator is graduated in 0.0001.

They are available in two series. The flat and parallel anvil type and the spherical upper anvil type.

Circle 37 on postcard for more data

Car Interiors Combine Beauty and Practicality

(*Continued from page* 55)

automotive stylists. Shortly thereafter, one major automobile producer adopted it as the sole floor covering ingredient for all of its 1959 cars.

Another manufacturer is using a substantial quantity of Skyloft carpeting in its 1959 line and is expected to use it in all of its 1960 models. A third company has reportedly chosen Skyloft carpeting for at least 80 per cent of its 1960 car line. According to American Enka, Skyloft yarn makes a loftier and more sightly carpeting with superior resistance to abrasion and matting.

Since 1925, the production of rayon in the U. S. has nearly doubled in poundage every five years and now ranks second among all textile fibers in the number of pounds used yearly. Due to high strength at low cost, dyeability, color fastness, etc., spokesmen for the American Rayon Institute foresee a promising future for expanded use of rayon in automotive interior fabrics.

Saran

Saran (vinylidene chloride) is a Dow thermoplastic possessing physical and mechanical properties which suit it for use in diversified fields. Its basic raw materials are petroleum and brine. Distinctive among its properties are resistance to chemicals and solvents; excellent resistance to acids in general; and very low water permeability.

The production of saran is largely used in monofilaments from which fabrics are woven. The inherent properties of the plastic are present in the monofilaments made by extruding continuous lengths from fine molding powders. Dow supplies the molding powders to extruders who manufacture the monofilaments and, in turn, sell them to weavers.

Perhaps the outstanding styling achievement contributed by saran fabrics has been the "puffed" fabrics, pioneered by Chicopee Mills in the automotive and other markets. Three-dimensional effects are achieved through the use of controlled differential shrinkage, using saran filaments that shrink in the finishing processes, to produce predetermined "puffed" patterns.

Other contributions to styling achievements are those of permanent colors that are "built in" to the saran powder before it is made into a textile filament. These colors are bright and lasting, and they provide the automotive stylist with a wide choice of colors that do not require dyeing.

The early saran filaments were round in shape. Round yarns are still used; but, in addition, there are now flat, oval, and spun yarns of saran. Also, the "shrinker" yarns have been developed fairly recently.

The spun saran yarns are now in current use in the automotive as well as in the furniture market. These yarns are spun from staple that is manufactured by Saran Yarns Co., jointly owned by Dow Chemical Co. and National Plastic Products Co. The saran staple can be spun on the woolen and/or cotton systems, either alone, or blended with other staples, depending upon the end use, yarn sizes required, etc.

A very recent development has been the introduction into the market of a new saran filament, with an extremely high luster, or "sparkle." This will permit the textile industry to get some metallic colorings that have not previously been available.

The use of saran, as a basic automotive fabric, has grown each year since it was introduced in a 1949 Packard model. A number of 1958 car models are using saran either on a 100 per cent basis or in combination with other fibers. Ford Motor Co. is using it in all Ford station wagons and trucks, two of the three Mercury station wagons, Medalist sedans and hardtops, and the Edsel Ranger station wagon. Saran fabrics are also found in all Dodge trucks and the Oldsmobile 88 station wagon. Further usage of saran fabrics is expected in the 1959 and 1960 models.

FABRICS IN 1958 CARS

The points brought out in the foregoing general discussion regarding trends in color, styling, and usage of materials in automotive fabrics can best be demonstrated by an examination of a cross-section of the 1958 car lines. Selected examples have been chosen for discussion below, and the accompanying illustrations also highlight features of the fabrics described.

Mercury

Interiors of the 1958 Mercury are marked by new weaves, new fabrics, and imaginative colors all color-coordinated with the car's exterior styling. Fabrics include new bodycloth patterns such as "tweed," "flame," "mirror," "diamond" and "modern," as well as vinyls (including breathable vinyl), cobblestone woven plastic, and genuine leather.

An innovation for Mercury in 1958 is a broadcloth trim scheme available in the Park Lane series. The Voyager and Colony Park station wagons carry a fabric of 100 per cent filament saran wrap with solution-dyed rayon filling.

Oldsmobile

For 1958, nine types of upholstery material in differing weaves and patterns are offered in Oldsmobile's three series. All Holiday models combine genuine leather or morocceen with long-wearing nylon fabrics.

The 98 Holiday sedan utilizes a combination of genuine hand-buffed leather bolster material with new design three-dimensional upholstery, the puffed nylon fabric which Oldsmobile first introduced in 1957. Altogether, three new three-dimensional designs appear on the 1958 line.

In the station wagon line, the Super "88" Fiesta has five color combinations. Bolsters are of genuine leather, with morocceen accent and upholstery fabric of three-dimensional nylon fabric, the same as that used on the Super "88" Holi-

More Government Contract Awards

(*Continued from page 77*)

CLEVELAND PNEUMATIC TOOL CO., Cleveland, Ohio
Spare parts for C124, B47-B57, F84F, C46, F86, C119 aircraft—$34,112

COMMERCIAL AIR PRODUCTS, A.S.R. PRODUCTS CORP., Los Angeles, Calif.
Spare parts applicable to B-66 aircraft —$28,755

CONTINENTAL MOTORS CORP., Muskegon, Mich.
Automotive spare parts, replenishment —2108 ea—$451,127

CONTINENTAL MOTORS CORP., Muskegon, Mich.
Fuel Engines—8 ea—$50,400
Tank Engines—1567 ea—$8,065,543

COOPER TIRE & RUBBER CO., Findlay, Ohio
Tire, 7.50 x 20, 8 ply—26,099 ea—$570,785
Tire, 9.00 x 20, 12 ply—11,800 ea—$507,-164

CROWN COACH CORP., Los Angeles, Calif
Buses—5 ea—$172,745

CUMMINS DIESEL SALES CORP., Memphis, Tenn.
Engine, diesel, 4 stroke cycle—6 ea—$30,600

DAKOTA FIRE APPARATUS CO., Brookings, S. D.
Truck, fire fighting—10 ea—$111,870

DEALERS INDUSTRIAL POWER CO., Memphis, Tenn.
Engines, gasoline, 8 cylinders—70 ea—$107,932

DELAWARE VALLEY MACHINERY, INC., Willow Grove, Pa.
Milling machine, horizontal—1 ea—$82,-848

DEMPSTER BROTHERS, INC., Knoxville, Tenn.
Truck, materials handling, 5 ton capacity—18 ea—$63,402

DETROIT BEVEL GEAR DIV., NAPCO INDUSTRIES, INC, Detroit, Mich.
Automotive spare parts, replenishment —6503 ea—$138,878

DIAMOND T MOTOR TRUCK CO., Chicago, Ill.
Trucks, 5-ton, 6x6, M-39 series, various models—$79,187

DOUGLAS AIRCRAFT CO., INC., Santa Monica, Calif.
Honest john fin assemblies, containers and accessory items—$557,716

DREIS & KRUMP MFG. CO., Chicago, Ill.
Brake, power press "Chicago Steel" model No. 458-D—1 lot—$15,475

ELECTRO MECHANICAL PRODUCTS CO., Garden City, Mich.
Automotive spare parts, replenishment —6035 ea—$265,059

ELLIOTT, J. H., CO., Washington, D. C.
Boring machine, horizontal, vertical, cap. 36 in. with 3 in. spindle—$39,695
Boring machine, horizontal, 3 in. spindle—1 ea; threading attachment—1 ea—$36,239

FEDERAL AIRCRAFT WORKS, INC., Minneapolis, Minn.
Spare parts for L-20 and C-47 series aircraft—$31,650

FIRESTONE TIRE & RUBBER CO., Los Angeles, Calif.
Guided Missile, surface to surface—$2,-086,215

THE FIRESTONE TIRE & RUBBER CO., Akron, Ohio
Tire, pneu, 13.00 x 20—850 ea—$124,457

FORD DIV., FORD MOTOR CO, Washington, D C.
Automobiles & station wagons—197 ea—$304,878
Automobiles—164 ea—$255,612
Sedans, station wagons & trucks—182 —$264,793

FORD DIV., FORD CO., Washington, D. C.
Trucks—33 ea—$113,516
Light trucks—124 ea—$194,230
Various quantities of trucks—$44,129

FRUEHAUF TRAILER CO., Detroit, Mich.
Chassis, trailer, 1 ton, 2 wheel—various quantities—$445,626

THE GATES RUBBER CO., Denver, Colo.
Tire, 7.50 x 20—5700 ea—$128,592

GENERAL MOTORS CORP., Cleveland, Ohio
Engine-Diesel, 6 cylinder—$78,726

GOODRICH AVIATION PRODUCTS, B. F., Dayton, Ohio
Wheel assy, main, spares for RF84F/RF, 84K aircraft—$366,235
Spare parts for B25, H5, H19, F80, F86A, D, E and F, F94A and B, T33A, RF84F, B52, C118A, C/RC121-CD aircraft—$27,709
Spare parts for C124 aircraft—$106,110
Wheels: Nose, for various aircraft—$26,-882

THE GOODYEAR TIRE & RUBBER CO., Akron, Ohio
Tire, 9.00 x 20—14,551 ea—$455,009
Tire, 11.00 x 20—21,544 ea—$1,150,234

GOODYEAR TIRE & RUBBER CO., Akron, Ohio
Wheel assys for F-84F, C-123B aircraft —$290,688
Wheel assemblies, main, for C-130A aircraft—$128,240
Wheel assys: main for various aircraft —$72,209

HARRINGTON-WILSON-DAUM CORP., Mount Vernon, N. Y.
Shear, Power, sheet metal—1 lot—$11,-159

THE HEALD MACHINE CO., Worcester, Mass.
Grinder, internal, horizontal—3 ea—$54,-427

HOUDAILLE, INDUSTRIES, INC., Buffalo, N. Y.
Spare parts for H-19, H-21, B-47, C-46, SA-16—$45,406

INSTRUMENT LABORATORY, INC., West Seattle, Wash.
Diesel electric power plants and control equipment—5 ea—$61,046

INTERNATIONAL HARVESTER CO., Washington, D. C.
Trucks—14 ea—$55,067
Truck, multistop delivery—575 ea—$1,-302,750
Truck, maintenance, telephone-utility construction—5 ea; Truck, Wrecker—1 ea—$40,877
Truck tractor—39 ea—$26,776
Vehicle, armored, infantry full truck—$276,833

JONES & LAMSON MACHINE CO., Springfield, Vt.
Thread grinder, automatic—1 ea—$44,-809

LANDIS TOOL CO., Waynesboro, Pa.
Heavy duty engine lathe—1 unit—$33,-468

LOCKHEED AIRCRAFT CORP., Sunnyvale, Calif.
Target Drone Missiles system XQ5 and related services—$2,500,000

LOUD, H. W., MACHINE WORKS, INC., Pomona, Calif.
Spare parts for F86 series aircraft—$34,760

LYNCOACH & TRUCK CO., Oneonta, N. Y.
Semi-Trailers—9 ea—$160,500

LYCOMING DIV., AVCO, Williamsport, Pa.
O-435-23B reciprocating engines for the H-13H aircraft—$345,290

MAGNAFLUX CORP., Chicago, Ill.
Unit, magnetic, inspection—1 lot—$34,-300

THE MANSFIELD TIRE & RUBBER CO., Mansfield, Ohio
Tire, 14.00 x 20, 14.00 x 24—318 ea—$58,-532

McCABE POWERS AUTO BODY CO., St. Louis, Mo.
Truck, line construction and maintenance—4 ea—$60,615

THE MOHAWK RUBBER CO., Akron Ohio
Tire, 13.00 x 24—1200 ea—$221,640
Tire, 13.00 x 20—900 ea—$108,000

MOREY MACHINERY CO., INC, New York, N. Y.
Shaper, vertical, 12 in. stroke, motor driven—5 ea—$81,632

THE MORRIS MACHINE TOOL CO, Cincinnati, Ohio
Machine, multi-station boring and milling—1 lot—$101,833

NORTHROP AIRCRAFT, INC., Hawthorne, Calif
Spare parts for F89 aircraft—$160,913

THE OLIVER CORP., Charles City, Iowa
Tractor, wheel type, industrial—16 ea; sweeper, rotary—1 ea—$41,890

PACIFIC INDUSTRIAL MFG. CO., Oakland, Calif.
Press brake—2 ea—$29,536

RADIOPLANE CO., Van Nuys, Calif.
Target drones—$720,921

ROCKWELL-STANDARD CORP., Ashtabula, Ohio
Brake shoe assy—6191 ea—$28,907

SEIBERLING RUBBER CO., Akron, Ohio
Tire, PN, 14.00 x 20, 12 ply—450 ea—$45,270

THE SIDNEY MACHINE TOOL CO., Sidney, Ohio
Lathe, Engine—1 lot—$197,093

SIKORSKY AIRCRAFT DIV., UNITED AIRCRAFT CORP., Bridgeport, Conn.
Modification of helicopters, Model HR2S —1—$1,996,665

SMITH, A O., CORP., Milwaukee, Wis.
Welder, 1500 amperes, rectifier type—10 ea—$33,940

SMITH, H. A., MACHINERY CO., Syracuse, N. Y.
Lathe, engine—1 lot—$56,208

SUPPLY DIVISION, CHRYSLER CORP., Detroit, Mich
Automotive spare parts, replenishment —3400 ea—$37,876

TAYLOR-WINFIELD CORP., Warren, Ohio
Welder, projection, spot—lot—$32,502

THOMPSON PRODUCTS, INC., Cleveland, Ohio
Valve, exhaust, engine—7836 ea—$114,-092

TRANSMISSION & AXLE DIV, ROCKWELL STANDARD CORP., Detroit, Mich.
Replenishment parts—543—$290,244

TRUCK & COACH DIV., GMC, Pontiac, Mich.
Trucks—7 ea—$28,796

TRUCK & COACH DIVISION, GMC, Pontiac, Mich.
Automotive spare parts, replenishment parts—261 ea—$125,755

TURCHAN FOLLOWER MACHINE CO., Dearborn, Mich.
Attachment, tracing, automatic—1 lot—$21,340

UNITED MOTORS SERVICE DIV., GMC, Detroit, Mich.
Auto spare parts—80,041 ea—$561,628

UNITED STATES RUBBER CO., Detroit, Mich.
Tire, 9.00 x 16—40,230 ea—$1,235,331

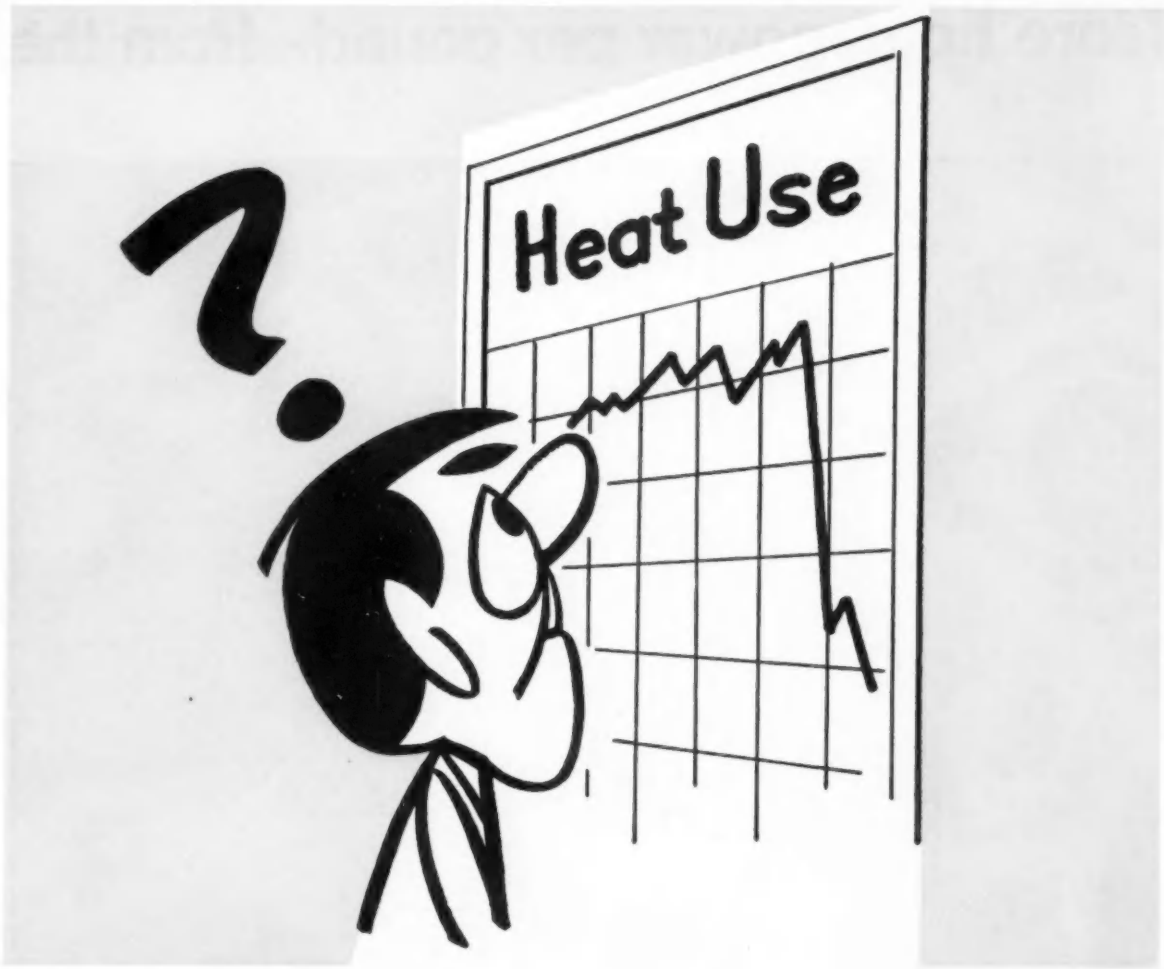
VERTOL AIRCRAFT CORP., Morton, Pa.
Overhaul of Government-owned army aircraft forward and aft transmission —100 ea—$66,100

VIERECK, GEORGE E., & CO., INC., Washington, D. C.
Boring, milling and drilling machine, 4 in horizontal motor driven—2 ea—$61,378

VIERECK, GEORGE E., & CO., INC., Washington, D. C.
Grinder, vertical, combination internal and external, 42 in. swing cap—1 ea—$87,760

WAGNER ELECTRIC CORP., St Louis, Mo.
Cylinder, wheel assy. (used on rear axle only)—10,452 ea—$29,278

(*Turn to page 118, please*)



THE CASE OF THE PUZZLED ENGINEER

(A Cold Bonderite* Story)

The plant heating engineer, wondering at the diminished demand on his heating plant, set out through the plant to find the cause. All was normal until he met the finishing superintendent. "Haven't you heard?" asked that happy gentleman. "We've installed Cold Bonderite* in our finishing line. Steam use is down 90% and water use is down 50%!"

*"Cold Bonderite" is the commonly used term for a phosphate coating system developed by and exclusive with Parker Rust Proof Company. Its use is saving many manufacturers thousands of dollars a month.

Since 1914—leader in the field

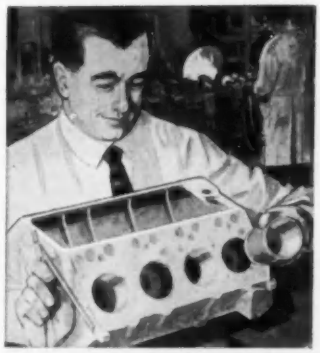
PARKER RUST PROOF COMPANY
2178 E. MILWAUKEE, DETROIT 11, MICHIGAN

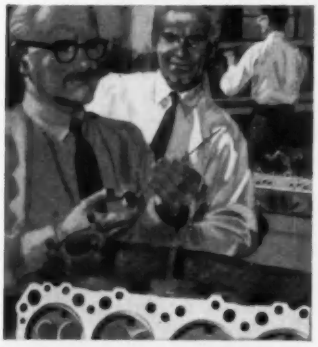
BONDERITE	BONDERITE and BONDERLUBE	PARCO COMPOUND	PARCO LUBRITE	TROPICAL
corrosion resistant paint base	aids in cold forming of metals	rust resistant	wear resistant for friction surfaces	heavy duty maintenance paints since 1883

*Bonderite, Bonderlube, Parco, Parco Lubrite, —Reg. U.S. Pat. Off.

More horsepower per pound – from the

Alcoa Aluminum engine





A distant dream? Not any more. Already the aluminum engine is standard on many foreign cars. Aluminum pistons, pioneered by Alcoa, have proved themselves in millions of cars now on the road. And the many other innovations that have come from Alcoa Development Division's Laboratories have enabled leading manufacturers to incorporate them in designs for an all-aluminum engine. Let's take a look at some of the developments that have made the all-aluminum engine possible—and desirable:

Cylinder Liners—As a result of more than a decade of experimentation, a recently announced hard coating of molybdenum sprayed on aluminum by the patented Metco "Sprabond" process gives it a wear resistance superior to iron. Development tests continue on other wear-resistant coatings and on special aluminum alloys.

Heads—Scores of tests conducted by Alcoa prove the advantages of aluminum heads. Exhaust valves have run an average of 125°F cooler at 4,000 rpm than in an iron head of identical design and compression ratio. Weight savings are as much as 40%, fuel can be four octane numbers lower. Heat is more evenly distributed, valves last four times longer.

Bearings—Alcoa has proved that solid aluminum bushings and bearings for connecting rods and mains have many bonus benefits. In a nonautomotive engine now in use, aluminum bearings are supporting 10,000 psi—far more than automotive bearings now support. And, because aluminum can support such high loads, bearing area can be reduced. This means you can design a stronger, stiffer, more durable crankshaft and have more throw space for balancing. Because aluminum is a good conductor and carries away heat fast, solid aluminum bearings can be operated at higher temperatures. Typical aluminum bushings sell for approximately the same price per pound as bronze, but you get three times as many bushings with aluminum.

Rocker Arms—To alleviate the problem of resonance and spring surge inherent in larger valve spring design loads, Alcoa designed a new aluminum rocker arm which weighs 40% less than malleable iron, reduces the accelerating forces required and permits a more resilient valve spring. This aluminum arm requires less machining because it can be die-cast to accurate tolerances.

LET ALCOA HELP

These are only a few of the many areas where Alcoa has pioneered in the development of the all-aluminum engine. As the most experienced producer of aluminum in the industry, Alcoa is in a unique position to help manufacturers design a completely new, lighter engine that will have improved weight and temperature distribution, better roadability and ease of handling. The complete facilities of Alcoa's laboratories and the knowledge and skills of its engineers are available to help *you* be first with the all-aluminum engine. Let us work with you. Write Aluminum Company of America, Development Division, 1848-H Alcoa Building, Pittsburgh 19, Pennsylvania.

ALCOA ALUMINUM gives every car more **GLEAM AND GO**

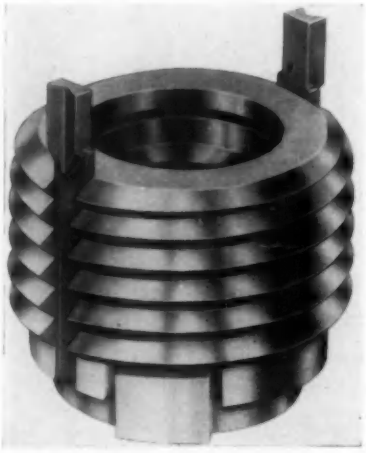
"ALCOA THEATRE"
Exciting Adventure, Alternate Monday Evenings

NEW PRODUCTS AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card on page 73

Self-Aligning Insert

This self-aligning internally-threaded insert is designed to compensate for misalignment of bolt



holes in mating parts. Supplied in one piece, it may be screwed by hand into tapped holes prepared with standard drills and taps. *Newton Insert Co.*

Circle 60 on postcard for more data

Aircraft Water Pump

The Ceco Model 9753 is a pump developed for the water injection system of jet aircraft power plants. It was designed to meet the requirement of remaining "dry" for long periods of time after supplying water for thrust augmentation at take-off. It delivers water at the rate of 90 gpm, operating at 6200 rpm. Operational temperatures may vary from —65 to 250 F. *Chandler-Evans.*

Circle 61 on postcard for more data

Piston Type Relief Valve

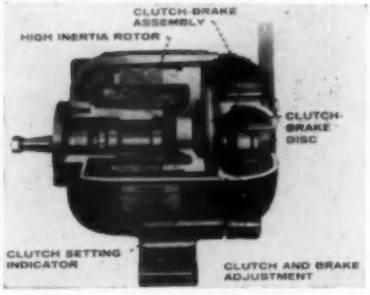
Differential piston type relief valves, available in four pressure ranges, having good pressure-flow characteristics, and recommended for applications where failure to hold pressure would endanger life and equipment are being offered by Fluid Controls, Inc. They are adjustable to any pressure setting between the limits of the pressure range selected.

Circle 62 on postcard for more data

Clutch-Brake Motors

Diehl-Ferguson clutch-brake motors employ a constantly rotating high inertia rotor to provide stored energy for smooth fast starts under suddenly applied loads in metal working and automatic production machinery.

The clutch-brake assembly, integral with the motor, is actuated by a lever operated by a double acting solenoid or air or hydraulic cylinder. Upon actuation, the lever engages the clutch with the continuously revolving rotor. Opposite actuation of the lever dis-



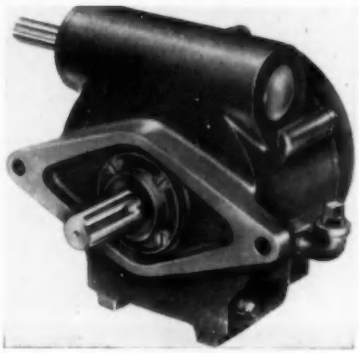
engages the clutch and causes a powerful brake to stop the output shaft. *Ferguson Machine Corp.*

Circle 63 on postcard for more data

Transmission

Model DS combination worm and planetary gear transmission rated at 225 ft-lb at 8 rpm output has a 220 to 1 ratio and incorporates a counter-clockwise input and output.

The heat-treated worm is of high carbon alloy steel and the worm gear is of two-piece construction, with the gear portion made with a bronze alloy. Containing chromium and vanadium, the sun gear is cut from an alloyed grey iron casting. The ring



gear is cut integral with the housing giving strength required to withstand the extreme pressures of the rated torque loads. *Merkle-Korff Gear Co.*

Circle 64 on postcard for more data

Flexible Radiator Hose

Each hose section of a type of flexible radiator hose is molded under heat and pressure, assuring uniformity. Full fabric reinforcement running the length of the hose minimizes elongation and ballooning caused by excessive pressures.

The inner surface of the hose is made of specially compounded synthetic rubber to withstand the rigors of temperature extremes, anti-freeze solutions and cooling system additives. *The Dayton Rubber Co.*

Circle 65 on postcard for more data

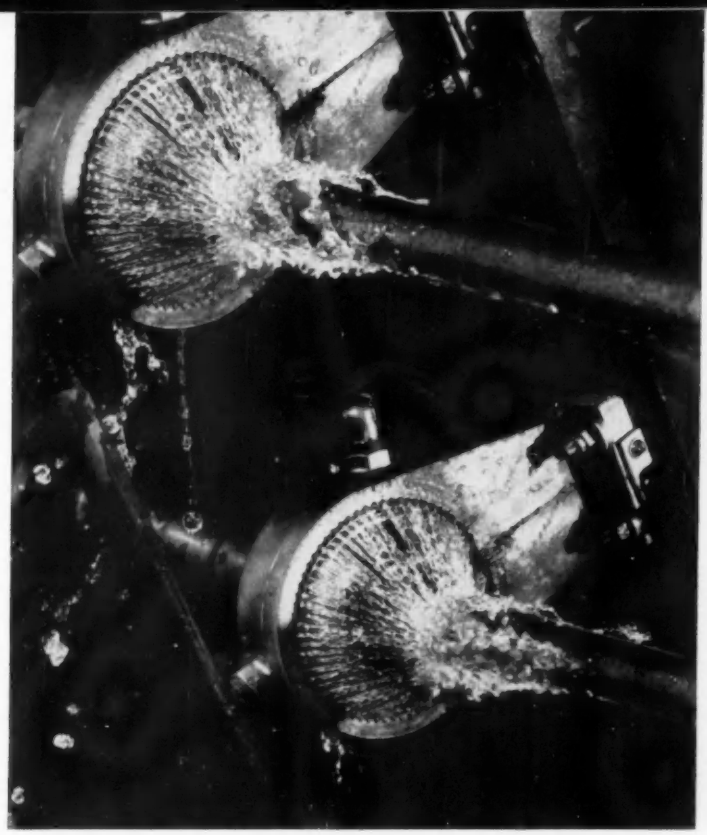
Miniature Air Cylinder

Miniature air cylinders, valves and fittings with standard ⅛-27 taper pipe threads provide adaptation to applications requiring high cycle opening, closing, holding, ejecting, marking, centering, counting, etc.

The ⅜ in. bore, ½ in. stroke, single acting spring return cylinder is machined from solid hexagon aluminum bar stock. The piston, ram and end cap are machined from cold rolled steel. *Air-Mite Devices, Inc.*

Circle 66 on postcard for more data

How Westinghouse Induction Heating Saved $152,880



Here is how Hightower-Morse & Company is successfully meeting the cost-price squeeze with Westinghouse Induction Heating. In the horizontal hardening of automotive axles, this progressive manufacturer found it imperative to invest in modern equipment to produce an improved product and hold the price to customers at a reasonable level. Here are the facts:

	SAVING PER AXLE
1046 carbon steel replaces costly 4145 alloy steel, yet scores high Rockwell hardness and greater toughness	75¢
Eliminates a stress-relief operation	13¢
Previously, all axles were hardness-tested; now necessary to spot-test only 3%	5¢
Hobbing machine cutters last longer	3¢
Drills last longer	1/3¢
Lathe tools last longer	1/5¢
Increases production because of less down time for changing cutting tools	1-9/10¢

Another saving—gas furnaces must run 24 hours a day at estimated $10 per-hour fuel cost, but Westinghouse Induction Heating uses current only when work is going through; electricity costs $3.50 per hour.

What's your problem—rejects, high costs, quality control? Your Westinghouse Induction Heating specialist can suggest applications in your plant for Westinghouse integrated production-line equipment.

Axles pass through coils of Westinghouse horizontal scanner two at a time at Hightower-Morse & Company. This one-man operation requires 60% less space than furnace heating; gives exact control of temperature and quench. J-35005-R

NEW—from Westinghouse Engineering and Development—LOW DISTORTION Induction Hardening Machine. It combines hardening, drawing and distortion reduction in one operation. Ask your Westinghouse specialist for complete information.

YOU CAN BE SURE...IF IT'S Westinghouse

The BUSINESS PULSE

Practically All Major Economic Indicators Showed Improvement During June, But Over-All Seasonally Adjusted Index of Industrial Production Is Not Expected to Rise Much Until After Labor Day

So far there have been no indications that the economic situation has been radically altered by the latest episode of Middle Eastern turmoil. Immediately after the revolt in Iraq and the movement of United States marines to Lebanon, speculative advances did occur in the prices of certain internationally traded commodities, and there was also some evidence of precautionary buying on a limited scale. At no time, however, has "scare buying" been part of the picture, nor have there been other signs of marked uneasiness.

Apparently people are becoming immunized to crises of this type, and of course they are aware of the easy supply conditions that now prevail for most commodities. If the situation in the Middle East does not take a new turn for the worse, the chances are that the impact of recent events may continue to be mild, inasmuch as there has been no hint from officials of the Department of Defense that military spending will be accelerated.

Slight Change in Economic Prospects

In brief, then, economic prospects seem pretty much unchanged, with hope for a sustained autumn upturn still hinging upon considerations that are essentially unrelated to the upheaval in the Middle East. These, fortunately, have become increasingly encouraging of late.

The rise in June for the second consecutive month in the seasonally adjusted index of industrial production was gratifying in two respects. First, the increase amounted to two full points, as had the May advance, thus carrying the index to a level more than 3 per cent above its recession low. And equally impressive was the fact that the June uptrend was broadly diffused, embracing a substantial majority of the 23 major industry groups that comprise the index. This across-the-board aspect strongly suggests that the rise was not a freakish, fortuitous occurrence, but constituted instead a meaningful firming of the industrial situation.

This Survey, published for the readers of automotive magazines exclusively in AUTOMOTIVE INDUSTRIES, has been prepared by the Guaranty Trust Company of New York

There seems a good possibility that the over-all seasonally adjusted index will fail to register further gains until after Labor Day, when plant-wide shutdowns for vacations will have been generally completed and when the automobile industry will be shaking off the effects of this year's unusually early model changeover. Such a failure of the index to make progress during the period of summer doldrums would not necessarily signify that the strength in May and June was temporary or unimportant. It is noteworthy that in 1954 industrial activity eased somewhat during the summer period, after having moved above the recession low reached in the spring, and then advanced briskly in the autumn.

Labor Market Improved

Virtually all other major economic indicators also showed gratifying results in June. The labor market proved capable of absorbing the stream of recent graduates and students looking for summer employment in much better fashion than had been anticipated only a few months ago, when fears were widespread that June might witness a rise in unemployment to the 6-million mark. The number of jobless did increase by some 500,000 to 5.4 million from May to June, but this rise was less than is normal for the period so that the seasonally adjusted unemployment rate actually declined slightly. Employment, meanwhile, rose by some 900,000 to 65 million, with the number of employes on nonfarm payrolls rising more than seasonally.

A particularly encouraging feature of June labor-market developments was the fact that factory employment showed further signs of stabilizing, suggesting that the decline of a year and a half's duration might well be over. This occurrence, together with a sharp rise in the factory work week, brought about the first increase of importance so far this year in factory payrolls, which had been hardest hit by the recession.

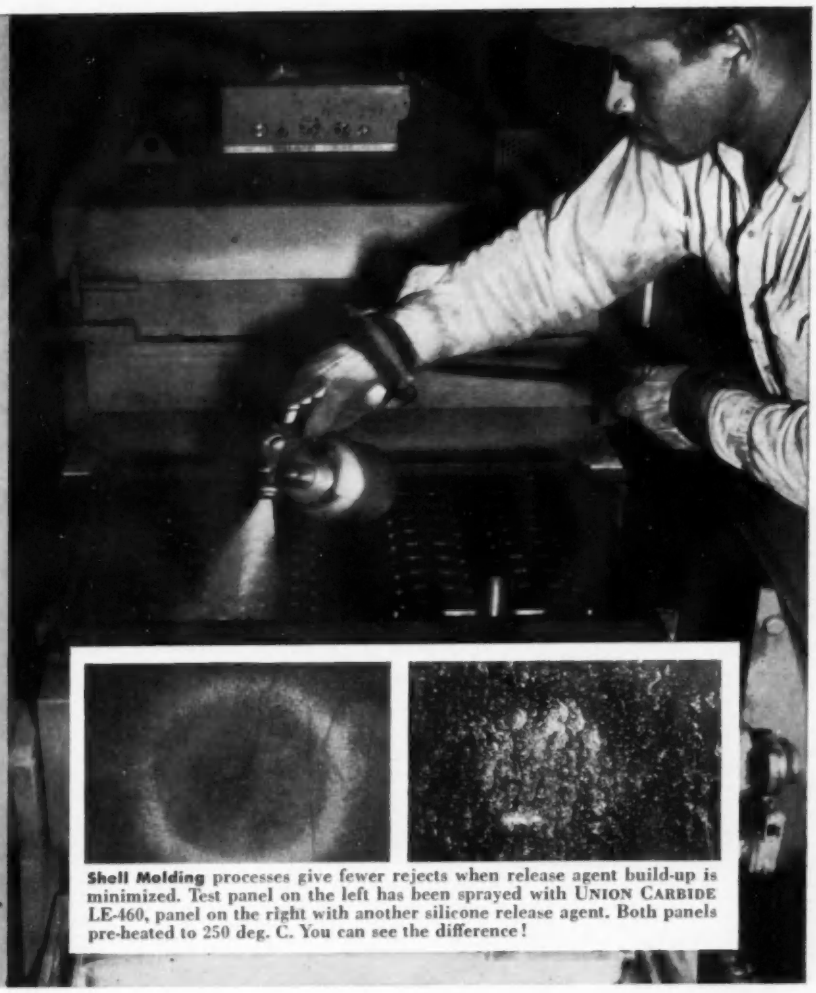
Rise in Income

Other wage and salary recipients as a group also enjoyed a rise in income during June (with recent pay increases for Federal

(*Turn to page* 96, *please*)

Data from the
SILICONES MAN

COMPARE THE BUILD-UP of these shell molding parting agents



Shell Molding processes give fewer rejects when release agent build-up is minimized. Test panel on the left has been sprayed with UNION CARBIDE LE-460, panel on the right with another silicone release agent. Both panels pre-heated to 250 deg. C. You can see the difference!

This test shows how the wrong release agents can build up and destroy tolerances in your shell molding process. But UNION CARBIDE LE-460 Silicone Emulsion release agent does not build up. With LE-460 Emulsion you get improved release, fewer rejects. And less time is lost for mold cleaning.

A unique process is used in compounding UNION CARBIDE LE-460 Silicone Emulsion. The result: even dispersal of the active silicone ingredient over the entire pattern surface—even when diluted with water 200 to 1! Water hardness will not cause separation . . . nor will pumping, aeration or repeated freeze-thaw cycles. LE-460 is delivered as a concentrate. You dilute it with ordinary tap water to suit your needs.

Your Silicones Man has a great wealth of information about silicone release agents . . . in the chemistry, properties and many applications of UNION CARBIDE Silicones. Call the UNION CARBIDE Silicones Man today; he has offices in most major cities. Or write for technical literature on "Silicones for the Shell Molding Process." Address Dept. **HB-4801,** Silicones Division, Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.

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UNION CARBIDE TRADE-MARK SILICONES

AIR BRIEFS

By R. RAYMOND KAY

The Ruble War is getting hot in the aircraft industry. ICBMs and Sputniks are not the only challenges the Soviet Union is throwing at the U. S.

There's a new one in the air: Jet transports to sell at half the price of U. S. made. The Russians are after world airline orders. And there are reports they've talked sales with a Douglas Aircraft customer.

It's a real threat to our aircraft industry which holds contracts to make 90 per cent of the world's jetliners. Today it's sitting pretty with $2 billion in orders. Industry economists predict that the world's airlines will need another $1 billion to $2 billion in jet equipment before 1967.

Russia is forging ahead with a build-up of a huge civil fleet of high-performance jet transports. And you have the word of President Donald W. Douglas, Jr., that the Russians are now flying airliners bigger "than anything we have on the drawing boards."

The Douglas DC-8 jetliner, carrying 118 to 144 passengers, will go into service next year. It sells for $5 million. There's no price tag on the Russian Tu-114, a 170- to 180-passenger jet. But it's understood in the trade that the 70 passenger Tu-104 is offered at $1.5 million. "We can't build that size here for double that," Mr. Douglas insists.

How can the Russians do it? By government subsidy. It's a grave challenge to our aircraft industry which must come up with an answer.

Russian Airlines Expanding

Sen. Alexander Wiley (R) Wis., senior minority member, Foreign Relations Committee, says that Russia poses a real global threat to the U. S. airline industry. "In route-miles flown throughout the world Aeroflot, Soviet State Airline, is now second to our largest flag carrier. Today, their air routes reach into 16 foreign countries," the Senator says.

"Plans are underway to extend Russian service to additional capitals and other major population centers." Sen. Wiley further points out that the Soviets are ahead in that they operate the world's largest fleet of jet transport planes.

The military implications of the Soviet airline establishment are foreboding. "Russia is building up her civil transport organization as a vital component of her total air power. That poses a challenge to U. S. strength in global airlift as well as in other areas of national defense," the Senator says. The nation must strengthen its airlines against the Russian bid for the world market.

New High Speed Aircraft

What's on the drawing boards in the U. S. aircraft-missile industry? It's building a prototype of the B-70, a chemically-fueled bomber and the F-108, long range fighter. Both these craft are Mach 3—three times the speed of sound.

The industry is also designing a far more advanced bomber with a speed of 4000 mph. It's working on new ICBM's more powerful, more accurate, and much smaller than our present models. And it's doing this even before the first ICBM becomes operational.

Manned Missiles

Just as we begin to enter the "missile age," it suddenly appears that it's only a way station; that the next step is to add a man to a missile. Then we give this manned missile another missile to fire at the target, and then we are right back where we started —back to the manned vehicle. All we have done is to provide man with a fantastically increased reach —both in space and time. That's how Orval R. Cook, President, Aircraft Industries Association, sees it.

Brief Air Briefs

Minuteman, the new ICBM to be fired from underground, should be ready in 1962. . . . Some plane-makers have as much as 50 per cent of their military backlog in missiles. . . . North American Aviation's B-70 "chemical bomber" is now dubbed Valkyrie. . . . More advanced propulsion devices are the most important single problem facing the space age. . . . About 50 per cent of the USAF military budget dollar will go for missiles next year. . . . The million-pound-thrust engine now being developed will be about three times more powerful than the three engines now on the Atlas ICBM. . . . The Soviet Union's Strategic Air Command is smaller than ours but it's being increased in strength to provide the backbone of Russia's offensive power.

• • •

Mounting engines to the rear of an airplane is the safest way to build jet aircraft. That's the word from Clarence L. (Kelly) Johnson, vice-president for Advanced Development Projects at Lockheed Aircraft Corp. He ought to know. He's the man who guided the development of his company's Jet-Star—a jet utility plane.

Extensive studies show that rear engine mounting for jet power plants has many advantages over

(*Turn to page* 112, *please*)

SUPERIOR STAINLESS

Automotive Trim

opens the door to sales

The magnetic *appeal* of solid stainless steel is stronger than ever for today's careful car buyers. It starts with inviting brilliance . . . keeps pulling with the promise of carefree enjoyment . . . clinches matters with the time-proved ability of stainless to keep new-looking to trade-in day.

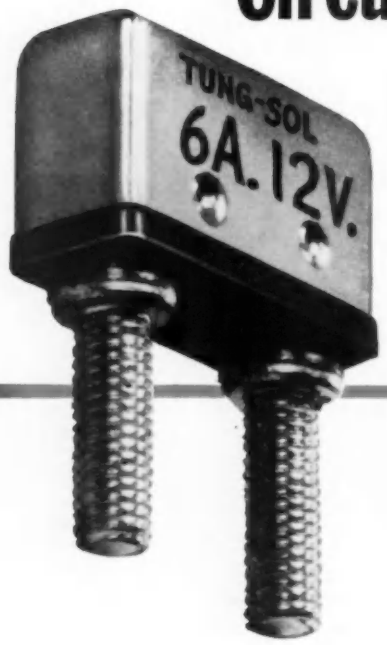
● *Build sales with Superior Stainless!*

Superior Steel

DIVISION OF
COPPERWELD STEEL COMPANY
CARNEGIE, PENNSYLVANIA

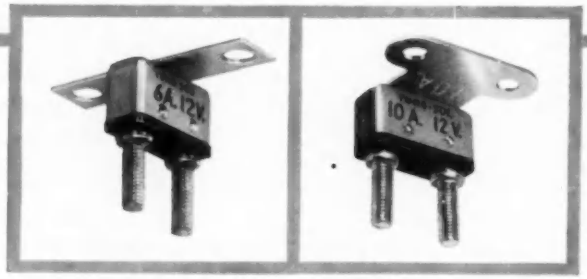
For Export: Copperweld Steel International Company, New York

Tung-Sol 12-Volt Remote-Reset Circuit Breakers



Positive "Lock Open" Action gives complete protection against:

BURNED-OUT ACCESSORY MOTORS AND WIRING
PERMANENT BREAKER DAMAGE
RUN-DOWN BATTERIES



Standard Mounting Brackets

The Tung-Sol remote-reset type circuit breakers *lock open*, instead of continuing to pulsate, when the circuit is overloaded or shorted. When the cause of the overload or short is removed, the breaker is then remotely reset. It reactivates the circuit within 30 seconds.

Available in 6, 10, 15, 20, 30 and 40 amp. ratings, in a choice of two mounting brackets, Tung-Sol Remote-Reset Circuit Breakers are used in a wide variety of automotive applications. For further information write Engineering Department.

METHOD OF OPERATION

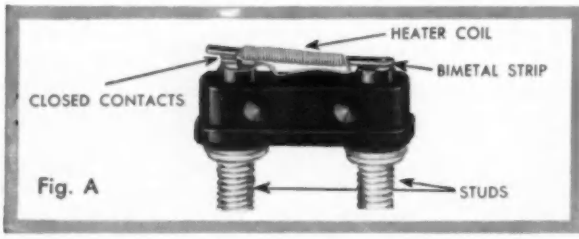


Fig. A

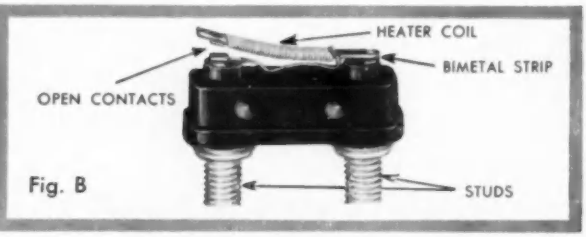


Fig. B

NORMAL CONDITIONS

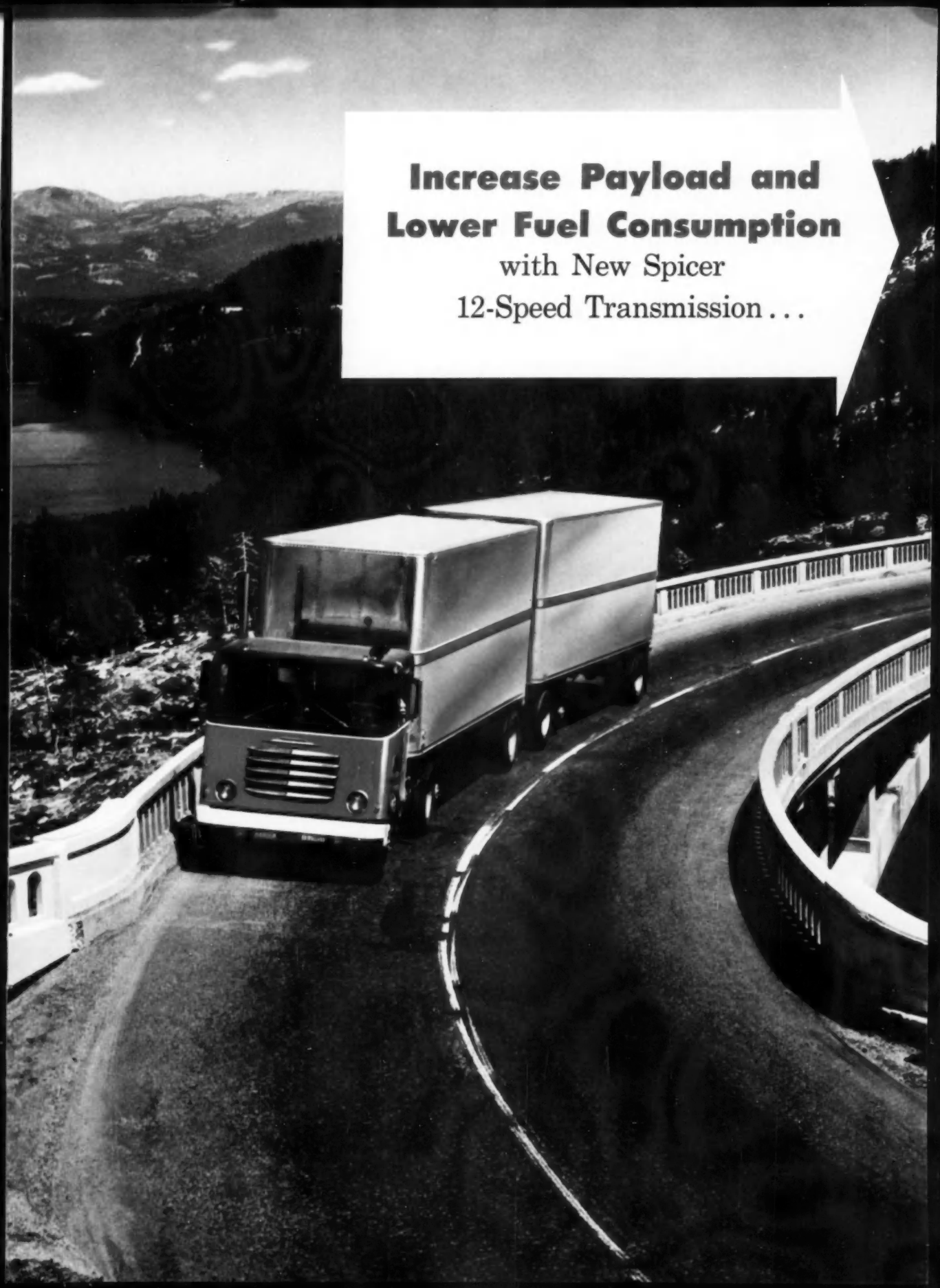
When circuit conditions are normal, the current flows thru the strip which is attached across breaker studs. When contacts are closed, the heater coil is short circuited and has no heating effect. (Fig. A).

EMERGENCY CONDITIONS

When a short circuit or overload occurs, the increased current causes strip to bend away from contacts. (Fig. B). When the contacts part, the coil is automatically inserted in the circuit.

ELECTROSWITCH DIVISION (ts) TUNG-SOL ELECTRIC INC., NEWARK 4, N. J.

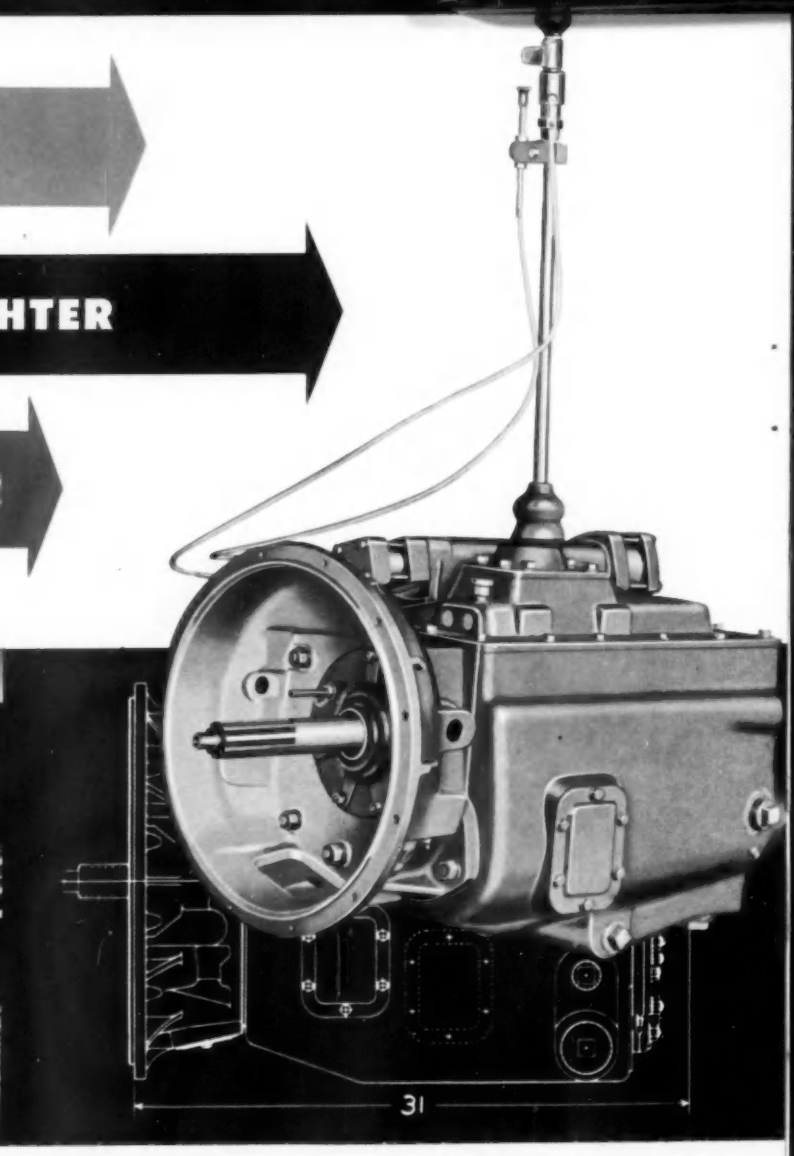
SALES OFFICES: ATLANTA, GA.; COLUMBUS, OHIO; CULVER CITY, CALIF.; DALLAS, TEXAS; DENVER, COLO.; DETROIT, MICH.; IRVINGTON, N. J.; MELROSE PARK, ILL.; NEWARK, N. J.; PHILADELPHIA, PA.; SEATTLE, WASH. CANADA: MONTREAL, P. Q.


Increase Payload and
Lower Fuel Consumption
with New Spicer
12-Speed Transmission . . .

12-SPEEDS

200 LBS. LIGHTER

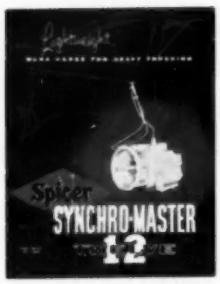
12 INCHES SHORTER



Now you can shorten the wheelbase by at least a foot, and increase payload by 200 lbs. At the same time you eliminate the auxiliary transmission and the two-speed axle.

No other transmission has ever given you so much efficiency—both on and off the highway—as your new Spicer Synchro-Master 12.

Write for booklet—Dana engineers want to help you adapt this revolutionary new Spicer transmission to your heavy-duty truck needs. Your letter, wire or telephone call will receive immediate attention.



DANA CORPORATION • Toledo 1, Ohio

DANA PRODUCTS Serve Many Fields:

AUTOMOTIVE: Transmissions, Universal Joints, Propeller Shafts, Axles, Power-Lok Differentials, Torque Converters, Gear Boxes, Power Take-Offs, Power Take-Off Joints, Clutches, Frames, Forgings, Stampings.

INDUSTRIAL VEHICLES AND EQUIPMENT: Transmissions, Universal Joints, Propeller Shafts, Axles, Gear Boxes, Clutches, Forgings, Stampings.

AVIATION: Universal Joints, Propeller Shafts, Axles, Gears, Forgings, Stampings.

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AGRICULTURE: Universal Joints, Propeller Shafts, Axles, Power Take-Offs, Power Take-Off Joints, Clutches, Forgings, Stampings.

MARINE: Universal Joints, Propeller Shafts, Gear Boxes, Forgings, Stampings.

Many of these products manufactured in Canada by Hayes Steel Products Limited, Merritton, Ontario

DANA
Spicer

Trends in Polish Vehicle Industry

(*Continued from page* 59)

cerned with making the Polish-designed Star 21 truck. Current output of this 4-tonner is 10,000 a year, operating at close to full capacity. While also burdened with an extraordinary degree of self-sufficiency that extends even to making its own tools like broaches, taps and milling cutters, the factory gives an impression of a rational approach to manufacturing and of fair efficiency in view of its handicaps. An illustrated report on it will appear in an early issue.

The Poznan Fair provided a chance to see some of Poland's latest and projected vehicles. Planned for production by the end of this year is the Star 25, which is based on the present Starachowice truck but with an improved six-cylinder gas engine and a five-speed gearbox with overdrive on the top ratio. The original power unit has been slightly bored out to give a displacement of 256 cu in., and a modified cooling system, together with the use of thin-wall bearings has given an increase in output to 95 hp at 3000 rpm. This 4-ton cab-over-engine model will be made in several body styles and in a long-wheelbase version.

Based on the Star engine and axle assemblies, but of integral body-frame construction, is the San bus which carries 43 passengers when the drop-seats in the aisle are employed. Body production and final assembly are done at the Sanok Autobus Factory. A futuristic prototype from the same plant is the Sanok 40-passenger touring coach with rear-mounted engine. Unusual front-end styling includes narrow, hooded air intakes resembling tail fins, and a large wrapped windshield. The rear-most seats face backward, giving passengers an expansive view through the large rear window that is identical to the front glass.

Entering the "microbus" field, Poland has now produced the 10-seater Nysa, with integral body-chassis and running components from the Warszawa car. The 129-cu in. L-head engine develops 50 hp at 3600 rpm and drives through a three-speed transmission. This model is also made as a panel van with a payload rating stated to be three-quarter tons. Of similar construction and rating but still in the prototype stage is the Zuk forward-control pick-up truck, whose body side-panels are heavily ribbed for strength and appearance. Another prototype under development is the Stal 300 quarter-ton van, powered by a 14-hp, two-cylinder motorcycle engine.

Poland's plans for the future are in a state of flux, and its general production program is understood to have been considerably revised during the past year. Some months ago the Polish authorities were negotiating with several western automobile manufacturers to make one of their small cars under license, but now this idea has reportedly been dropped. Instead, plans are being pushed ahead for producing the Polish-designed 14-hp Mikrus and 27-hp Syrena. The latter is already coming off the assembly line at the Zeran factory, although output this year will be only 1000 units.

At the same time, a complete revision of the Warszawa has started. A new overhead-valve engine will be ready in two years, an improved suspension system will follow, and a $62,000 contract has been signed with Ghia to prepare body designs for the sedan, station wagon and truck cab. These Italian-styled models, to be designated FSO-Ghia, are expected to be in production by 1962.

The Poles are also looking doubtfully at the possibility of a licensing agreement to build a British Diesel for the Star truck. Commer (Rootes), B. M. C. and Perkins engines have been considered, but now it is believed that a six-cylinder engine of local design will eventually be produced because of the difficulty in meeting western materials specifications. Meanwhile, it is likely that 3000 power units will be imported from Britain

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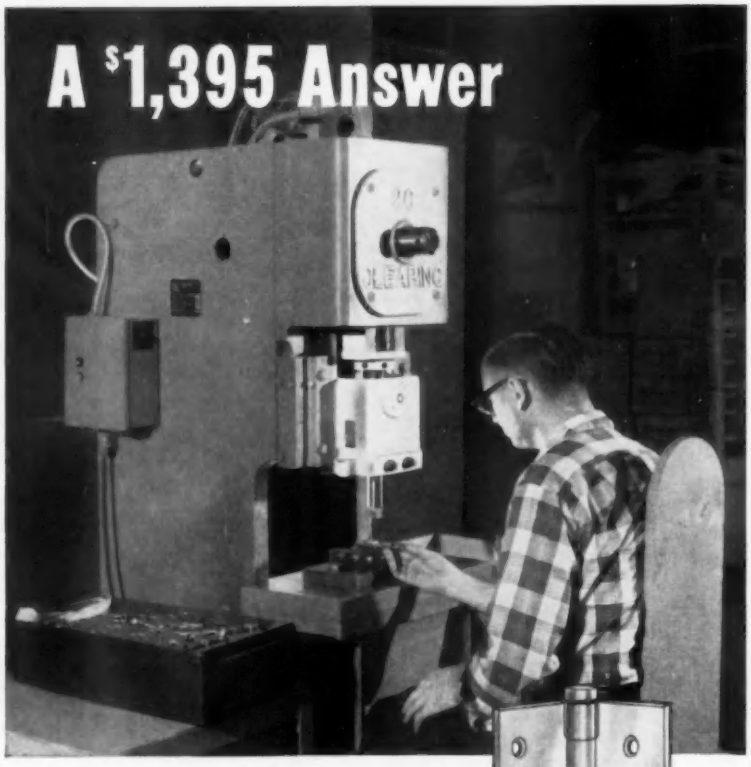

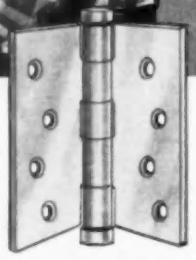

Clearing 22 ton Torc-Pac O.B.I. provides a low cost solution to manufacturing quality hinges.

When you admire the smooth, quiet opening and closing of a heavy office building door you may be unknowingly praising the quality of ball bearing hinges produced by Lawrence Brothers, Inc., Sterling, Illinois.

Lawrence uses a new Clearing Torc-Pac O.B.I. for one of their operations. This is the machine equipped with air friction clutch and brake and a sealed-in-oil drive. Like the hinges, operation is smooth and quiet. Speeds go up to 225 SPM.

If you have need of an O.B.I. in the 22 to 45 ton range, take a tip from Lawrence, try a Clearing Torc-Pac. You'll find it's a lot of machine for the money. Speedy dependable operation at low cost. That's a Clearing Torc-Pac O.B.I.

Want more information? Send for free catalog today.

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the way to efficient mass production

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to cover the retooling period at Starachowice. That factory may also make a 671-cu in. Diesel for the new 8-ton A-80 truck scheduled for production at Jelcz.

Despite this unpromising outlook for business, more western automobile manufacturers exhibited at the Poznan Fair this year than ever before. They included British Ford, Austin, Nuffield, Rootes, Rover, Standard, Leyland, Scammell, A.C.V., Fiat, Citroen, Renault, Krupp, Deutz and Daimler-Benz.

BUSINESS PULSE

(*Continued from page* 88)

personnel an important factor). The combined result was a rise of more than $2 billion at a seasonally adjusted annual rate in the wage-and-salary component of personal income during June, the second consecutive monthly gain for this type of purchasing power. In June, seasonally adjusted retail trade approximated $16½ billion for the third consecutive month, as compared with a recession low of $16.1 billion in both February and March, when there was a good deal of fear that consumers might be taking serious alarm over recession tendencies.

Rise in Gross National Product

These various signs of stabilization and improvement, together with the marked strengthening which has recently taken place in new housing activity, seem to bode well for the autumn period. Preliminary indications are that gross national product was slightly higher in the second quarter than in the first, seasonally adjusted, and it does not seem at all unreasonable to expect that the third and fourth quarters will witness an extension of the rise. A tapering off of inventory liquidation can apparently be anticipated with some confidence, and this will tend to bolster GNP. New-model automobile production should also prove at least a moderate stimulus this autumn.

Handling Connecting Rods

(*Continued from page* 61)

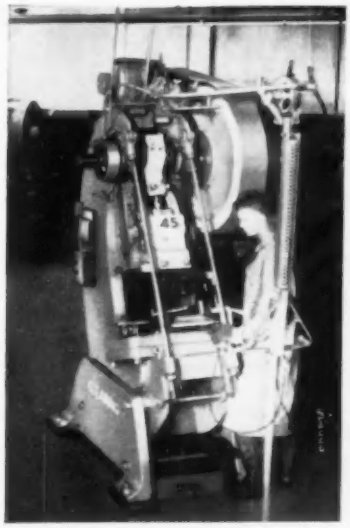
spotting eight empties on the outer roller conveyor. As it takes a long time to fill all gondolas on the inner line, the fork truck can be used elsewhere for considerable periods between those in which it removes loaded gondolas from the ends of the inner line, moves them to a shot peaning machine and returns the empties to the ends of the outer line. All shifts on the two roller conveyors are automatic and occur either by gravity or by the air operated shifters. The shifting cycle is of short duration and it is necessary only to stop the two discharge conveyors. Coining and stress relief operations go on uninterrupted.

Although the light beam directed at the electronic eye is cut frequently by forgings that fall into the gondolas, such interruptions are short. As a time delay is provided, shifting of gondolas occurs only when forgings build up above the tops of the gondolas, which are then substantially full, hence no overflow of forgings can occur.

Normally, the whole setup described runs with one operator to load the rod forgings into the magazine of the press but needs part time of two fork truck operators, one of whom keeps the press bin supplied with forgings and the other attends to the removal of filled gondolas from one roller conveyor line and returns empties to the other line. Efficiency of the entire operation is greatly improved.

At present, if a die change or other delay makes it necessary to stop the press, Fig. 1, for more than a short time, a duplicate die in another press, not yet provided with an automatic feed, can be put into production at a slower rate.

Plans for the future, however, contemplate a duplicate or equivalent mechanical feed for a second press to discharge coined forgings into the same furnace now used, as this furnace has capacity for double its present load. In that event, the same automated furnace discharge system can be used, but fork truck shifting will have to be stepped up to handle the increased output.



WE LIKE TO TELL CUSTOMERS WE HAVE

CLEARING O.B.I.'s

Parkview Metal Products Co., Chicago, Ill.

"As a job shop we need dependability. Schedules are important if you're going to keep customers satisfied so we can't afford time-consuming delays for maintenance. That's one reason we like our ten Clearing O.B.I.'s. But there's more to it than that. We like to tell prospects about our Clearings. Then they know we really have the equipment to handle their jobs."

PROBLEM: FORMING REINFORCED PLASTICS

IT'S BEING DONE ON THIS

CLEARING HYDRAULIC

Clearing hydraulic presses come in all sizes and types. They are designed to produce top results in hundreds of different applications with many unusual materials including the important "new" metals.

This one, for example, is designed for maximum results in the forming of fiber reinforced plastic parts for a large automotive manufacturer. Call on Clearing to help solve any Plastic or Metalworking problem having to do with Forming, Forging, Briquetting, Straightening, etc.

Write for Clearing Hydraulic catalog and informative bulletin.

BULLETINS
- ☐ Automation Accessories
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- ☐ Enclosed Presses
- ☐ Cushions

CATALOGS
- ☐ Series-S Crankshaft Straight Side
- ☐ O.B.I.
- ☐ Bottom Drive
- ☐ Hydraulic
- ☐ Brochure—"New Economics of Press Automation"

MOVIES
- ☐ A Modern Fable
- ☐ Transflex—Automation in Action
- ☐ Modular Automation
- ☐ Automation Comes of Age

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the way to efficient mass production

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Why automotive manufacturers prefer N-A-X® FINEGRAIN STEEL for bumpers

WIDE RANGE OF SHAPES AND CONTOURS
The complexity of today's automotive bumpers demands a steel that provides maximum strength plus unlimited shape and contour possibilities.

FLAT POLISHES TO A HIGH LUSTER
The hardness and fine grain of N-A-X FINEGRAIN renders this steel capable of assuming a high degree of luster at minimum cost.

REDUCES POLISHING COSTS
Bumpers made of polished N-A-X FINEGRAIN suffer no surface disturbances due to coarse grain or strain caused by the drawing process. Preparation costs before plating are thereby reduced.

LESS OVERHANG WEIGHT
Generally, the most difficult bumpers can be made of N-A-X FINEGRAIN with a minimum of 25% increased yield strength over mild carbon steel. This makes possible greater resistance to indentation and substantially decreased overhang weight.

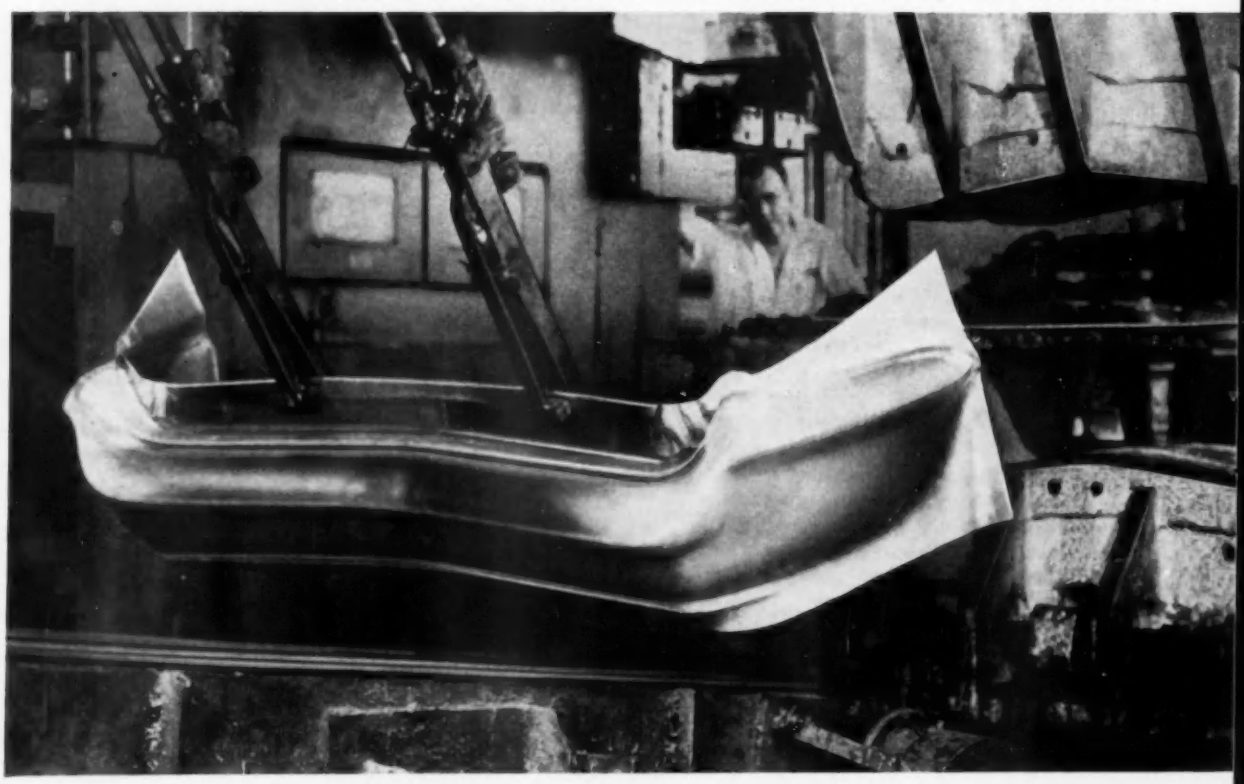
No wonder automotive manufacturers prefer dependable N-A-X FINEGRAIN for the difficult jobs.

CHECK THESE IMPORTANT ADVANTAGES FOR YOUR JOB:
N-A-X HIGH-STRENGTH steels—both N-A-X HIGH-TENSILE and N-A-X FINEGRAIN—compared with carbon steel, up to 50% stronger • have high fatigue life with great toughness • are cold formed readily into difficult stampings • are stable against aging • have greater resistance to abrasion • are readily welded by any process • offer greater paint adhesion • polish to a high luster at minimum cost.

Although N-A-X FINEGRAIN'S resistance to normal atmospheric corrosion is twice that of carbon steel, N-A-X HIGH-TENSILE is recommended where resistance to extreme atmospheric corrosion is important.

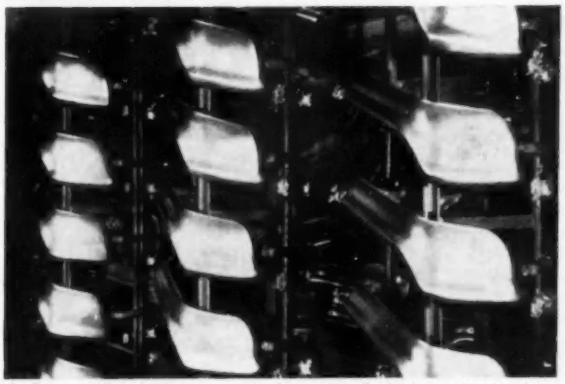
For whatever you make, from steel boats to steel bumpers, with N-A-X HIGH-STRENGTH steels you can design longer life, and/or less weight and economy into your products. Let us show you how.

3 Bumper wings, drawn double from N-A-X FINEGRAIN, emerge from press. After splitting and trimming, the protective draw coating is removed. Contoured bumper is then ready for plating without subsequent polishing.



1 Hot rolled N-A-X FINEGRAIN sheets come out of flat polish with a finish of less than 10 microinches.

2 Sheet with protective phosphate and draw coatings comes from coating machine ready for the draw press.



4 Bumper wings loaded on elevator for plating. Protective coating has been removed. Note no surface disturbances occurred after drawing operation.

5 Final inspection after plating. No expensive hand-polishing was required from original flat polish to plating operation.

N·A·X®
HIGH-STRENGTH STEELS

Product Development Division, Dept. J-6

GREAT LAKES STEEL CORPORATION

Detroit 29, Michigan • Division of

NATIONAL STEEL CORPORATION

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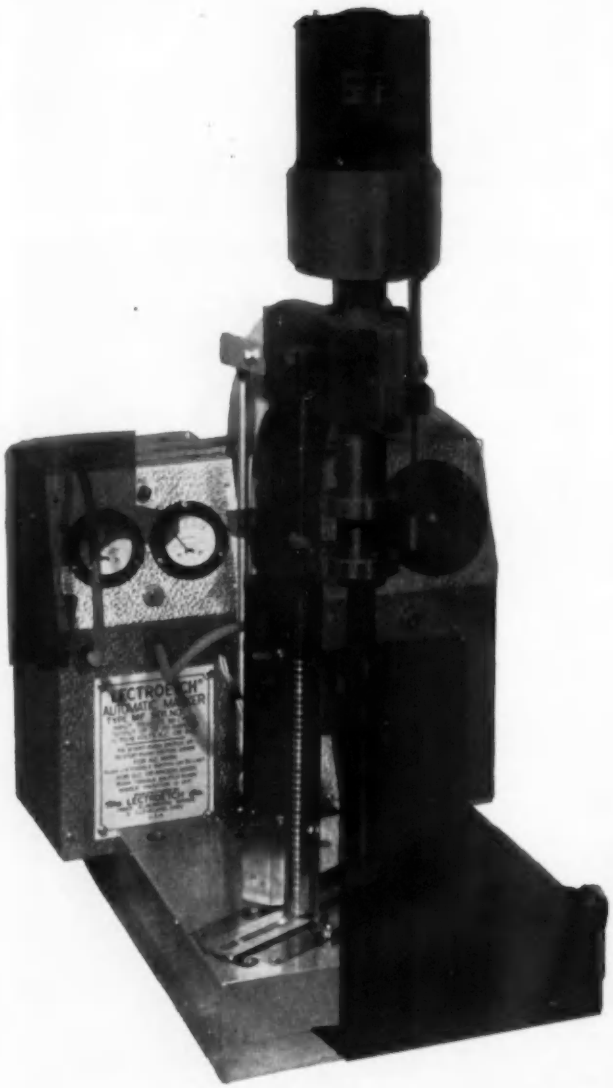
now!... *high-speed* parts marking with magazine feed



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Lectroetch electrolytic stencil-etch marking can be applied to your needs for high-speed accurate metal marking . . . thanks to the new automatic instrument above. Lectroetch marks any commercial metal without stress or distortion . . . and its low cost will surprise you! Want details? Write today!

The LECTROETCH® *Co.*

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SHORTIES

Employment in motor vehicle manufacturing in 1957 averaged 815,500, including 652,000 production workers—a slight increase from 1956. Total production payrolls for the year were $3,330,000,000, up about $117 million.

•

Highway expenditures in 1957 —for all roads and streets— totaled $8,636,000,000, compared with revenues of $7,648,000,000.

•

Helicopters flew 3,420,000 revenue passenger miles in 1957 compared with 1,571,000 miles the previous year—a gain of 117.7 per cent.

•

Manufacturing activities outside the motor vehicle industry itself produce between five and six billion dollars worth of automotive products annually, and employ 330,000 or more. It is also estimated that another $6 billion in products is turned out each year in connection with the operation, protection or maintenance of motor vehicles.

•

More than 10.3 million persons now are employed in motor vehicle and parts manufacture, the production and handling of crude and refined petroleum, selling and servicing motor vehicles, making or maintaining roads, truck and bus transportation.

•

The aircraft and missile industry is spending about $135,000 each working day on formal training programs to improve manpower skills and techniques.

•

More than $267 million—21 per cent—of the $1 billion paid to subcontractors of the aircraft industry engaged in ballistic missiles work in 1957 was in turn paid out to small business subcontractors.

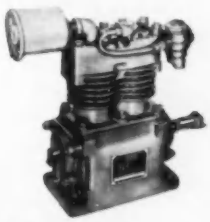
"Man, That's *FAST* Delivery!"

You can count on the Midland Man for the fastest possible delivery of parts for your air or vacuum braking systems. Your nearest Midland Distributor (there are over 250 in the U. S.) carries a complete stock of genuine Midland parts — the parts preferred and used by leading fleet operators because they're built for long, dependable, trouble-free performance. And his factory-trained service men will put your equipment's braking system in top condition and have it back, ready for the road, in jig time.

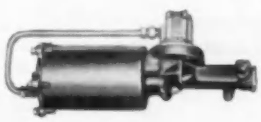
Ask your Midland Man about Midland's money-saving Factory Rebuilt Exchange Plan. You can run your Midland Compressors several hundred thousand miles — then have them re-built at the factory by specialists — and they'll carry the regular new equipment Warranty! The same goes for Midland valves, Hy-Power units, and other products.

Quick, near-as-your telephone Midland service means fewer breakdowns, more efficient use of all your vehicles . . . at a lower cost.

For the name of your nearest Midland Distributor, consult the "yellow pages" or write direct to the factory.



Model 7.4 Air Compressor



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OWOSSO DIVISION • OWOSSO, MICHIGAN

Export Department: 38 Pearl Street, New York, N.Y.

The Only Complete Line of Braking Equipment

POWER MIDLAND BRAKES

for extreme temperatures

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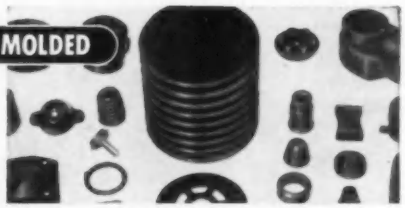
RUBBER PARTS AND COMPONENTS BY

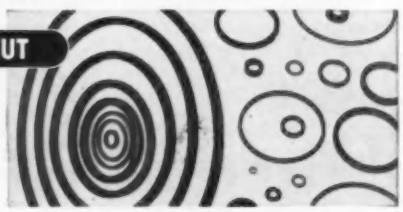
Goshen Rubber

Goshen-developed silicone rubber compounds offer properties like resistance to temperature extremes −80 to +500° F; resiliency over a range of −120° F to +600° F; low compression set; resistance to chemicals, oxidation, ozone, moisture, corrosion, shock, abrasion; freedom from stain, odor, tackiness and toxicity; same shrinkage as organic rubber, with resultant advantages.

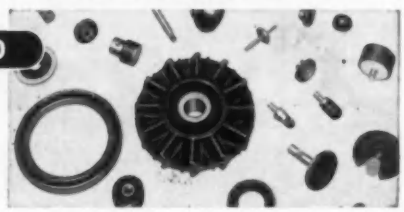
CUSTOM MOLDED



LATHE CUT



BONDED



GORSIL compounds are now available for adaptation to your next part problem that involves temperature.

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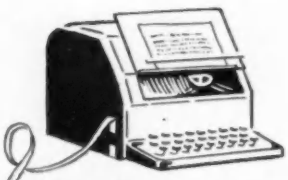

ON OUR WASHINGTON WIRE

Despite some rather weak hints from the White House to Government agencies for a "hold the line" policy on spending, nearly every Federal official is demanding more money. In all cases, national defense is stated as the justification. Likely result: a new Federal Budget of around $80 billion—and no tax cuts.

Congress is ready to approve a research and engineering director in the reorganized Defense Dept. His job: to coordinate projects, wipe out waste, get better results for research dollar. Direct research spending is up to nearly $2 billion a year; indirect is even higher.

The Collective embargo on shipments to Communist countries, imposd by the U. S., the Western European nations, and Japan, has been largely scrapped. In its place these Free World nations have drawn up a new and greatly shortened list of goods whose shipment to Communist countries is still forbidden.

The principal types of items remaining on the embargo lists are military supplies and atomic equipment. Nearly all the so-called war-supporting items, such as machinery, vehicles, and textiles, have been taken off the embargo list.

Detailed explanations of the action are now being drawn up by the State Dept. for the benefit of exporters, and a list of the permitted items, plus procedural directions, will become available soon.

Here's further evidence that the Pentagon regards the cold war as a permanent institution: Military chiefs have recently sent word to the Congress that they want permanent authority to negotiate procurement contracts without having to call for bids.

The Defense Dept's authority to circumvent laws calling for bids on contracts is contained in the First War Powers Act which was enacted early in World War II. This contract authority has been renewed several times since it was first enacted.

Government spending for military aircraft is to climb in the months ahead. The extra dollars for this purpose were added to the defense budget as a result of congressional concern over Middle East crisis. About a dozen more B-52 bombers and about 60 KC135 tankers will be built.

The little booklet on alloy steels that grew into a textbook . . .

Quick Facts about Alloy Steels appeared for the first time in 1956, as a collection of reprints of a series of Bethlehem advertisements in metalworking magazines.

The small booklet was well received, and we kept adding more of the informative advertisements as we reprinted it to keep up with demand. Today, it has grown to 40-page size, and is in its Third Edition. More than 20,000 booklets have been distributed at the written request of executives, engineers, designers, and others, who have found *Quick Facts* to be an authoritative small textbook on the fundamentals of alloy steels. Here's what a U. S. Navy engineer wrote:

"*Quick Facts* is a small textbook of information—a booklet that has been needed for a long time. One of my associates and I had a metallurgical problem involving alloy steels. We just didn't have the information. A friend showed me a copy of your booklet *Quick Facts*, and there on one page, under the subject 'Determining Depth Hardness,' was just what we wanted to know!"

The current booklet contains reprints of the complete series of advertisements, on such subjects as, "What is an Alloy Steel?" "Effects of Elements," "Grain Size," "Heat-treatment," "Quenching Media," and others. It's written in concise, layman's language, from data compiled by Bethlehem's metallurgical engineers.

Would you like a copy of the *Quick Facts* booklet? Just fill out and send in the coupon.

PUBLICATIONS DEPARTMENT, ROOM 1030
BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

Please send me your "Quick Facts about Alloy Steels" booklet.

*NAME*_____

*COMPANY*_____

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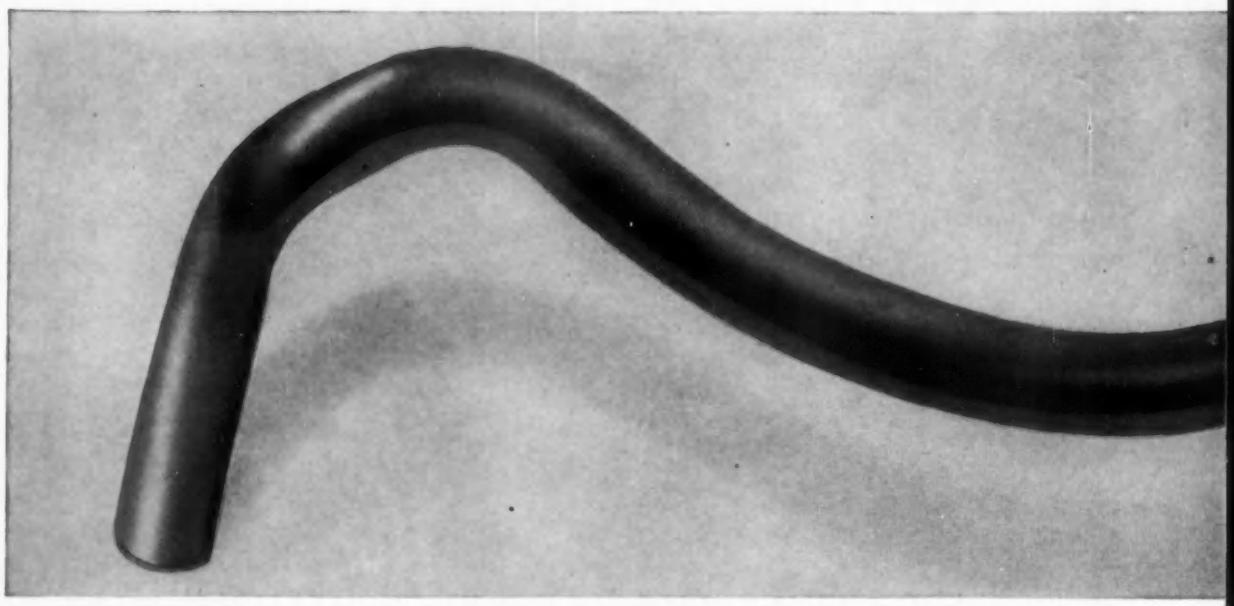
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

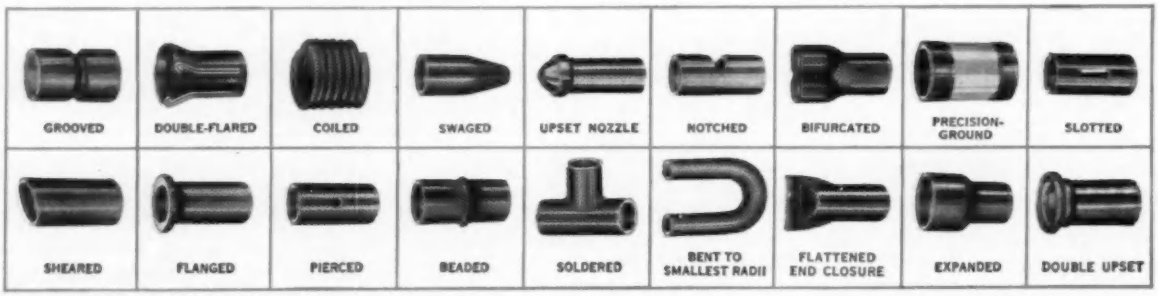
BETHLEHEM STEEL



Multiple-bend discharge tube for refrigeration compressor is fabricated quickly, economically on Bundy-designed fixtures. Seven bends are put into a 7" length of ¼ x .028" Bundyweld in just one semi-automatic operation.

BUNDYWELD...BENT

TYPICAL FABRICATION OPERATIONS POSSIBLE WITH BUNDYWELD TUBING



Shown above are but a *few* of the fabrication operations possible with Bundyweld Steel Tubing. Many of these — and others not shown — were developed through solving a specific problem brought to us by a customer or prospect. At any stage in the development of your product, Bundy invites you to take advantage of this design service.

BUNDYWELD IS DOUBLE-WALLED FROM A SINGLE STRIP

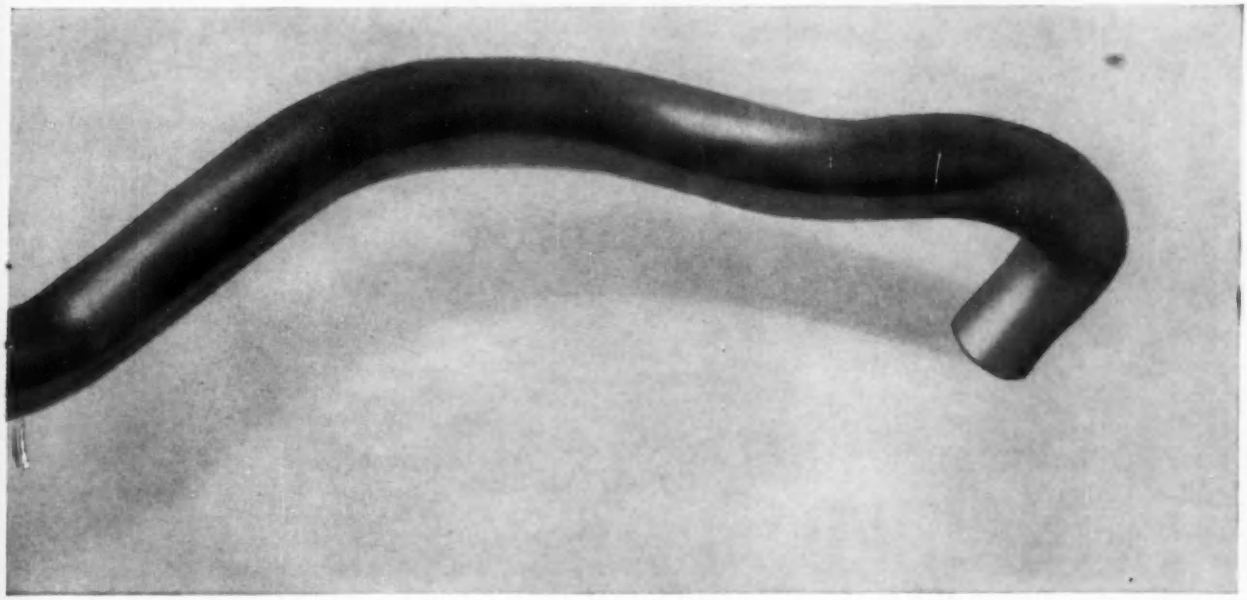
Bundyweld starts as a single strip of copper-coated steel. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness, and

passed through a furnace. Copper coating fuses with steel. Result . . .

Bundyweld, double-walled and brazed through 360° of wall contact.

← **NOTE** the exclusive Bundy-developed beveled edges, which afford a smoother joint, absence of bead, and less chance for any leakage.



7 TIMES IN 7 INCHES

. . . and Bundy's fabrication experts mass-produced the part at low unit cost!

Seven bends in just seven inches—a tough fabrication operation, impossible with ordinary tubing! Yet Bundyweld® Tubing took the stresses . . . stayed *leakproof by test.*

Double-walled from a single *steel* strip, Bundyweld withstands high pressures and vibration fatigue. No wonder it's on 95% of today's cars, in an average of 20 applications each.

Bundy® engineers will design your tubing part, or work with your designers at any stage in the creation of a product. Many times they can point out money-saving shortcuts.

With Bundyweld, there's no such thing as an "impossible" bend. And Bundy can turn out tubing parts by the millions . . . package them with care, and deliver them right on schedule.

Check first with Bundy—where you get dependable Bundyweld Tubing plus unmatched design and fabrication services. Bring *your* tubing problems to Bundy. Call, write or wire us today!

BUNDY TUBING COMPANY, DETROIT 14, MICHIGAN

WORLD'S LARGEST PRODUCER OF SMALL-DIAMETER TUBING • AFFILIATED PLANTS IN AUSTRALIA, ENGLAND, FRANCE, GERMANY, AND ITALY

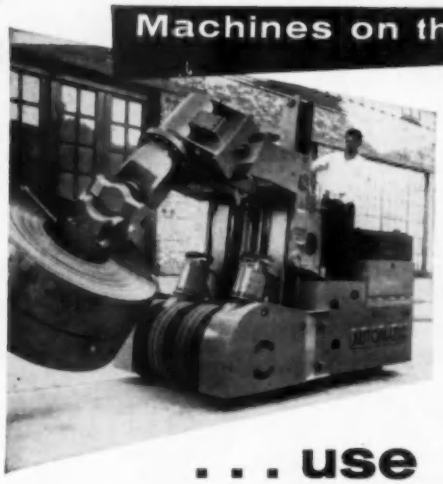
There's no real substitute for

BUNDYWELD® TUBING

Bundy Tubing Distributors and Representatives: ***Northeast:*** Chas. H. Stamm, 10 N. Main St., West Hartford, Conn.; Austin-Hastings Co., Inc., 226 Binney Street, Cambridge 42, Mass. • ***Middle Atlantic:*** Atlantic Tube & Metals, Inc., 451 New Jersey State Highway #23, Wayne, N. J.; Rutan & Co., 1 Bala Ave., Bala-Cynwyd, Pa. • ***Midwest:*** Lapham-Hickey Steel Corp., 3333 W. 47th Place, Chicago 32, Ill.; Midco Supply Company, 1346 South 20th Street, Omaha, Neb.; Williams and Company, Inc., 901 Pennsylvania Ave., Pittsburgh 33, Pa. • ***South:*** Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg., Chattanooga 2, Tenn. • ***Mountain:*** M. L. Foss, Inc., 1901-1927 Arapahoe Street, Denver 1, Colo. • ***Southwest:*** Vinson Steel & Aluminum Co., 4606 Singleton Blvd., Dallas, Texas • ***Northwest:*** Eagle Metals Co., 4755 First Avenue, South Seattle 4, Wash. • ***Far West:*** Pacific Metals Co., Ltd., 2187 S. Garfield, Los Angeles 22, Calif.; Pacific Metals Co., Ltd., 1900 Third Street, San Francisco 7, Calif.

Bundyweld nickel and Monel tubing are sold by distributors of nickel and nickel alloys in principal cities.

Machines on the move.....



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POWER to operate these machines and countless others that you may see every day, travels *smoothly, efficiently, dependably* through FAIRFIELD GEARS. By specializing exclusively in "Fine Gears Made to Order", Fairfield has become one of America's largest independent producers of these parts.

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Gears and Differentials for FINE GEARS *Made to Order for:*

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MINING MACHINES • ROAD GRADERS • BUSES • STREET SWEEPERS • INDUSTRIAL LIFT TRUCKS

Ford Steering Gear Components

(*Continued from page* 57)

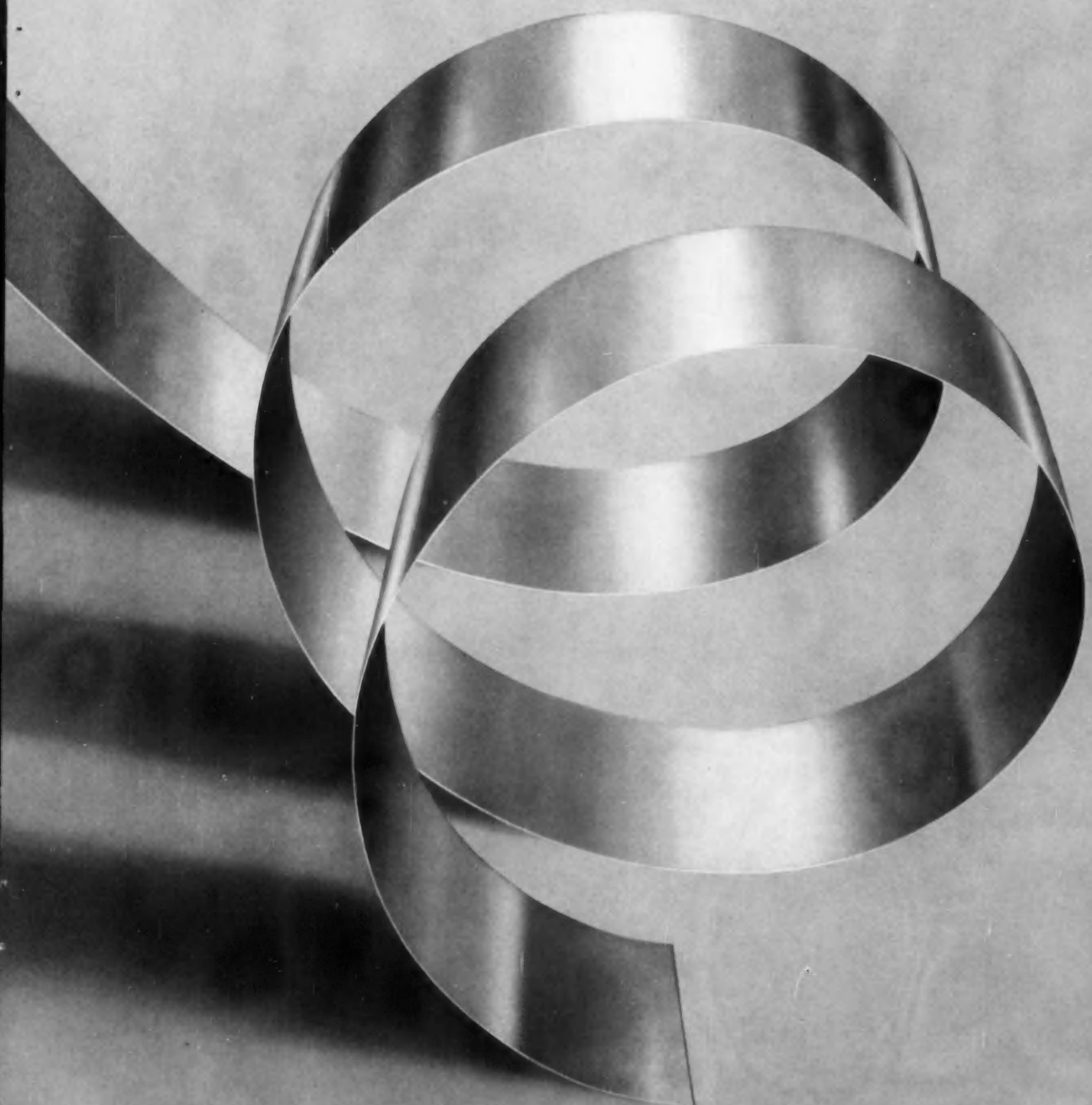
eliminates brittleness. A Power and Free conveyor next carries the pieces to the finish grind area, where both short and long shanks of the sector shaft are ground on Cincinnati grinders, first to semi-finish size, then to finish. The two grinders are tied together by a conveyor so that the pieces are fed automatically from the first, where they are semifinish ground, to the second, and the finish grinding. The finished pieces are then carried on a belt conveyor to Magnaglo inspection, and to the assembly line.

The steering gear rack starts as rectangular bar stock, of SAE 5120 steel. This is first sawed to length on a Motch and Merriwether automatic saw. The blank is next deburred and copper plated, so that subsequent machining operations will provide bare steel surfaces on the rack teeth on the outside, and on the helical ball race on the inside of the piece, and these can be case hardened. The rack teeth are cut on a 90-in. LaPointe Dual Ram broach in two passes. The pieces are then loaded onto a belt conveyor and taken to Snyder special drilling and reaming machines, each with 16 stations, in which the ball guide return holes are drilled, reamed, and countersunk, and internal diameter thread holes are drilled, bored, and reamed. The ball groove is machined on a Hanson-Whitney thread mill, automatically loaded and unloaded. Carried on a monorail conveyor to a Rhenberg-Jacobson tapping and reaming machine, one hole is tapped and four others are reamed. The racks then go to the heat treat area on Power and Free conveyors and are loaded manually into the carburizing furnace. As with the other pieces, a deep case, 0.040 to 0.060 inches is produced. In the finish grind area the ball race on the internal diameter is ground on special Excello and J & L internal thread grinders. The entire output of racks next goes through the Magnaglo inspection, and then to an automatic gaging and sorting machine in which

(*Turn to page* 110, *please*)

stainless strip – to your specifications

If stainless strip is part of your product, consider using Crucible stainless. Crucible precision-rolls it to your exact specifications — produces finishes that are surpassingly lustrous. And Crucible's painstaking methods ensure uniform metallurgical quality as well as gauge uniformity in coil after coil. Why not obtain these combined qualities next time you need stainless? Crucible stainless is available in all gauges down to .010" and in all widths. Write to *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*



CRUCIBLE STEEL COMPANY OF AMERICA

Canadian Distributor — Railway & Power Engineering Corp., Ltd.

ALLIS-CHALMERS

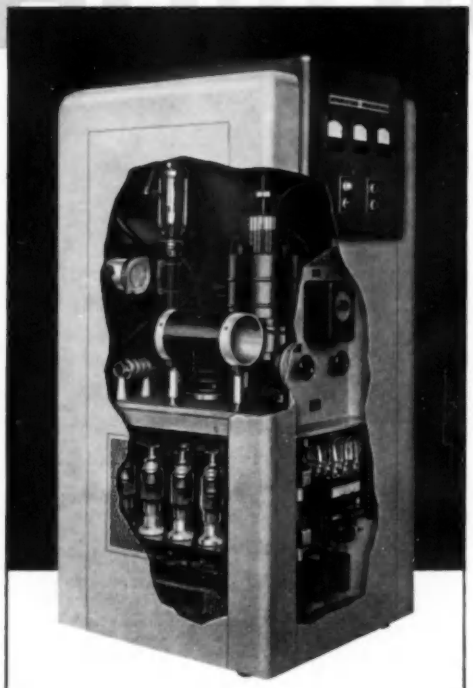
This is What Careful Buyers Want to Know about Induction Heating Equipment...

First — they want to know that they will get cost-cutting performance and dependability. This is basic... and it is the basic reason for the widespread acceptance of Allis-Chalmers induction heaters for hardening, annealing, brazing, melting.

Then — careful buyers want to know how well the equipment is backed up by the manufacturer's experience, engineering, research and service facilities. Again, Allis-Chalmers excels.

A-C engineering includes help in planning the most efficient use of induction heating in your operation, the design and manufacture of work fixtures and handling equipment, the testing of your material samples in A-C's modern laboratory. When your heater is installed, a field engineer from one of the A-C regional offices near you supervises the job.

There is an A-C representative in your area who can give you more details. Call him, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin, for Bulletin 12B6430B.



Check These Quality Features

1. Water-cooled oscillator tube has life expectancy of 5000 hours or more — with ample reserve capacity for emergencies.

2. Plate transformer is designed for continuous, heavy-duty service... has large reserve capacity.

3. Six-tube, three-phase full-wave rectifier section is standard... choke coil and capacitor network protect rectifier tubes from high-frequency currents.

4. Compact, attractive all-steel cabinet provides electrostatic and electromagnetic shielding.

5. Output circuit is based on simple principle which eliminates need for extra, expensive output transformers.

6. Precision automatic timer and all necessary controls are standard. No extras (except handling equipment) required.

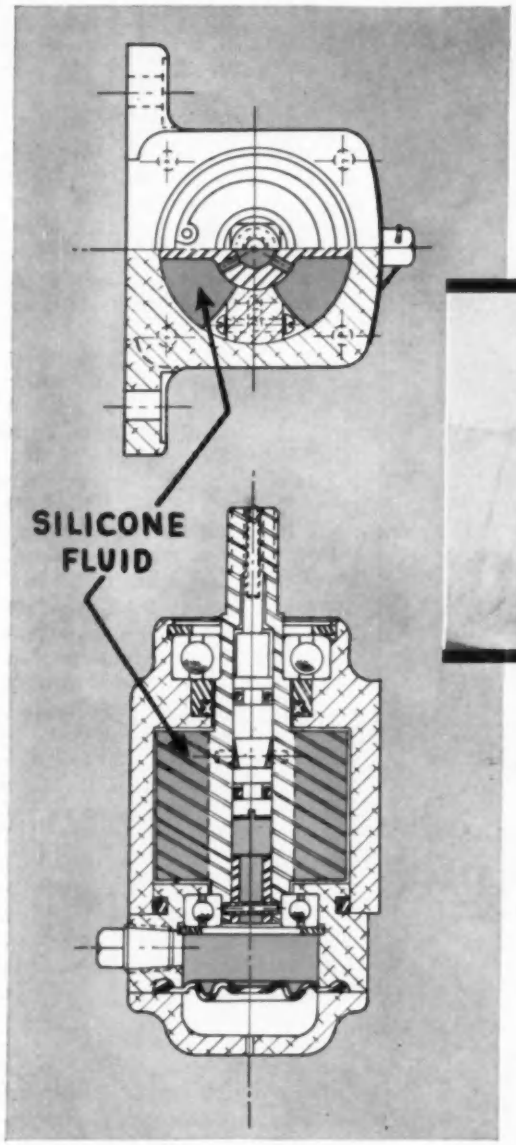
7. All operating controls are clearly marked and mounted on one panel.

8. Safety features: heavy-duty control, high water temperature switch, high and low water pressure switches, fuses, interlocked doors.

And ... Bakelite standoffs, adequate clearances, clean wiring arrangements, ceramic coils, heavy duty relays.

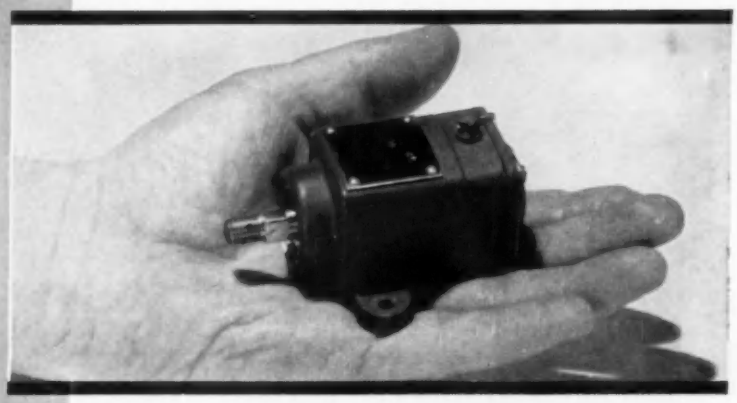
A-C ALLIS-CHALMERS

A-5775



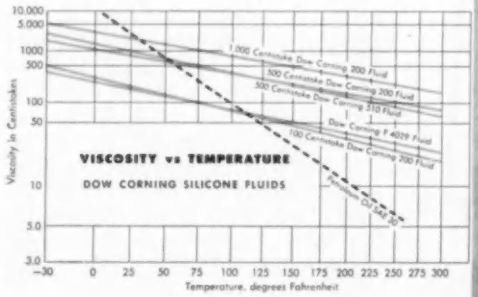
VIBRATION DAMPER EFFECTIVE OVER 225 DEGREE RANGE, NEEDS NO TEMPERATURE COMPENSATION

Sesco Manufacturing, Inc., produces an extensive line of aircraft vibration damping mechanisms utilizing Dow Corning Fluids. Shown is the Model 1025 Miniature Viscous Damper, which damps at rates of 0.5 to 25 inch-pounds per radian per second at 70 F. This unit, effective from —65 to 160 F, needs no temperature compensation over its entire range due to the silicone fluid's stability and indifference to temperature change. Vibration damper Model 1025 offers the advantages of small size, light weight, and minimum friction torque.



How to design for higher efficiency with SILICONE FLUIDS

Dow Corning silicone fluids offer you wider design latitude through many advantages not found in petroleum-base oils. Silicone fluids show little change in viscosity over broad temperature ranges. Resistance to oxidation and to breakdown due to shear are excellent. Damping force, torque transmission and rate of flow through an orifice are remarkably uniform. These properties make Dow Corning fluids more efficient media for damping, torque conversion and hydraulic applications. Also, their greater compressibility under very high pressures makes them ideal for liquid springs. For more information on properties and performance data, call our technical representatives in the branch office nearest you, or write Dept. 068.



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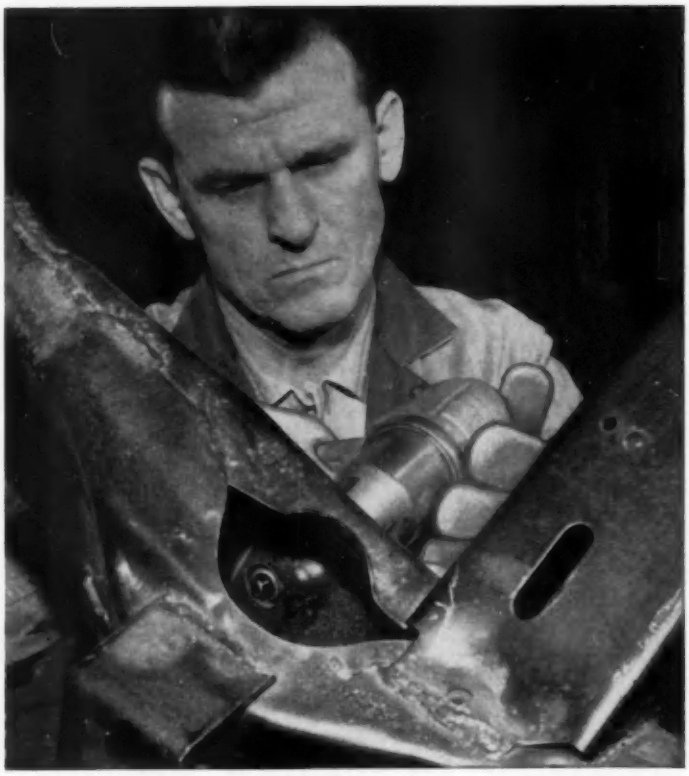

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WELDING NUTS

for those hard-to-reach spots

Whether you're designing or fabricating, check your fastenings. Are they in hard-to-reach places? Does assembly take two men? Those are the spots for Midland Welding Nuts.

Midland Welding Nuts take seconds to apply, yet they save hours in assembly time. And, they're a better fastener. Spot welded into place for the life of the product, Midland Welding Nuts can't come loose or cause annoying rattles.

Want cost and time-saving tips? Send for the free booklet showing you how to "Save with Midland Welding Nuts."

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Ford Steering Gear Components

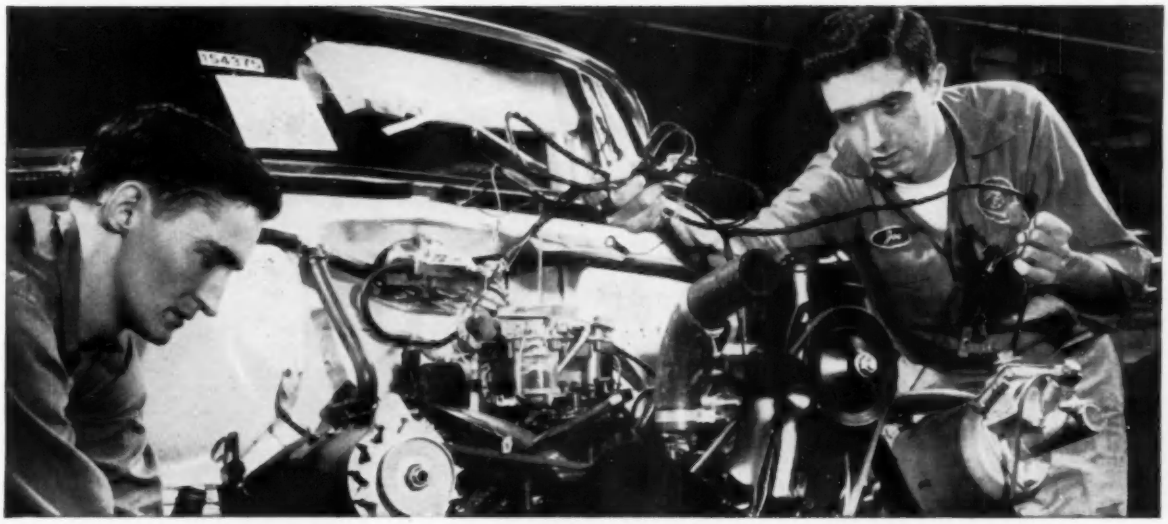
(*Continued from page* 106)

the ball race is gaged and the pieces are sorted and marked according to four standard sizes, each size color coded for assembly with a worm of the same standard. The racks then go to the final assembly line.

The third of the three parts is the steering gear worm, which rides inside the rack and is joined to it by the ball bearings in the race.

The stock for it is cut from coiled heavy wire of SAE 5120 steel, cold drawn to size and extruded in a bolt making machine. These blanks are taken to the machine area by lift truck, and are rough ground on the outside in a Cincinnati through feed grinder. The pieces then go to New Britain 8-spindle double indexing chuckers, in which one bearing (the ball) race is semifinished, and a construction slot is milled off center and tapered to locate all future operations. The piece is then turned over, and the shank diameter is turned and bearing race semifinished. Pieces are fed and ejected automatically in these machines. They next go on a belt conveyor to Excello and J & L grinders, where the ball groove is rough ground. Carried to the copper plating installation, the shank end is plated to keep it soft during subsequent carburizing. This is necessary because the steering shaft is flash welded to the shank of the worm in a later operation, and a brittle weld must be avoided. The pieces are next carburized in the heat treat area furnaces, a deep case being produced as with the other units. In the finish grind area the outside surface is ground on Landis centerless grinders, bearings and ball groove races are ground on Excello and J & L grinders in separate operations. All pieces are Magnaglo inspected, and then go to a Vinco gaging and sorting machine, where they are color coded and sorted into four standard sizes as with the racks. The steering shafts are flash welded to the worms in a Federal flash welder, the weld

FACT / *The extra care Packard takes here!*



RESULTS / *In extra savings for you here!*

When you snap on a Packard Electric wiring harness, you know *it's right!* Packard Electric harness designers have worked closely with you and your component-part suppliers, so when the assembly line is reached, everything keeps going like clockwork.

Another thing about Packard Electric wiring harnesses: All the parts are made and assembled at Packard. This provides a quality control that is unique in the cable industry, and results in saving you money, time and trouble. What's more, every tenth Packard Electric employee is a fully trained inspector who uses the latest testing mechanisms, plus his own experience, to give you perfection in every unit.

If you are not already using Packard harnesses, as many automotive manufacturers do, it will pay you to start doing so soon. Packard Electric maintains offices in Detroit, Chicago and Oakland, California, for your convenience.

Packard Electric

Warren, Ohio

"Live Wire" division of General Motors

area is turned smooth, and each shaft-and-worm assembly is then given a bend test under controlled impact, straightened, turned 180 deg, and again bent and straightened, to detect any brittleness in the weld area. The pieces are then Magnaglo inspected, and conveyed to final assembly.

On the final assembly line, the balls and guides are assembled in a special machine into the racks, parts are mated and assembled into a housing, the adjusting cap is tightened, a preload is set on the worm, the mesh load is set, and the steering column assembled to the unit.

AIRBRIEFS

(*Continued from page* 90)

pylon-mounted engines on a wing.

The JetStar, with engines at the rear, has flown almost ten miles high and at nearly the speed of sound. It's had more than 300 hours of test flying.

"No adverse effects of any kind have been discovered attributable to the rear engine location. The JetStar has demonstrated excellent flight and performance characteristics," Mr. Johnson says.

Rear engine mounting, with inlets above the low swept wings, offers these advantages, according to Mr. Johnson:

(1) Much greater safety, especially in case of a wheels-up landing, since the engines are protected by the wings.

(2) Unlike jet engines located under the wings and close to the ground, the higher, protected engines don't have the problem of picking up stones and other ground objects. There's greater safety to ground crew members walking around the airplane when engines are running. In flight, the wing acts as a guide vane to direct the inlet flow.

(3) Exterior noise is reduced, since the fuselage shields noise effects for many angles around the aircraft. Interior noise levels are so low that passengers and crew members can talk to each other in normal tones.

(4) Ditching characteristics are improved since the nacelles are located where they can't dig into the water.

(5) A failed turbine wheel can't go through the pressurized area of the fuselage or fuel tanks.

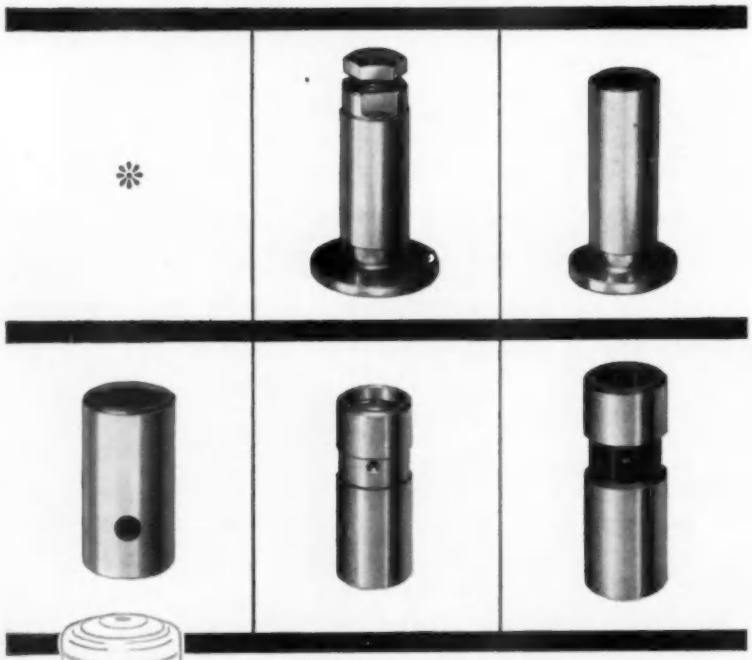
(6) Excellent drag characteristics.

(7) Improved maximum lift because of uninterrupted flap span.

• • •

This reporter trekked through the new $40 million Convair Astronautics 1.2-million-sq-ft plant in San Diego recently. It's one of the largest and most modern facilities for production of long-range missiles. Right now the plant is only in pilot production of the Atlas ICBM. It's ready to go full steam ahead. Seventy-five hundred persons will man it.

JOHNSON *tappets*



keep pace with today's engines

Continual experimentation and excellent manufacturing methods show a steady product improvement that make JOHNSON TAPPETS worthy of your consideration. Only proven materials, covering a range of steel, chilled iron, and various iron alloys are used in the manufacture of JOHNSON TAPPETS, providing greater strength, light weight and increased wear resistance. Serving the AUTOMOTIVE — AIRCRAFT — FARM — INDUSTRIAL — MARINE Industries.

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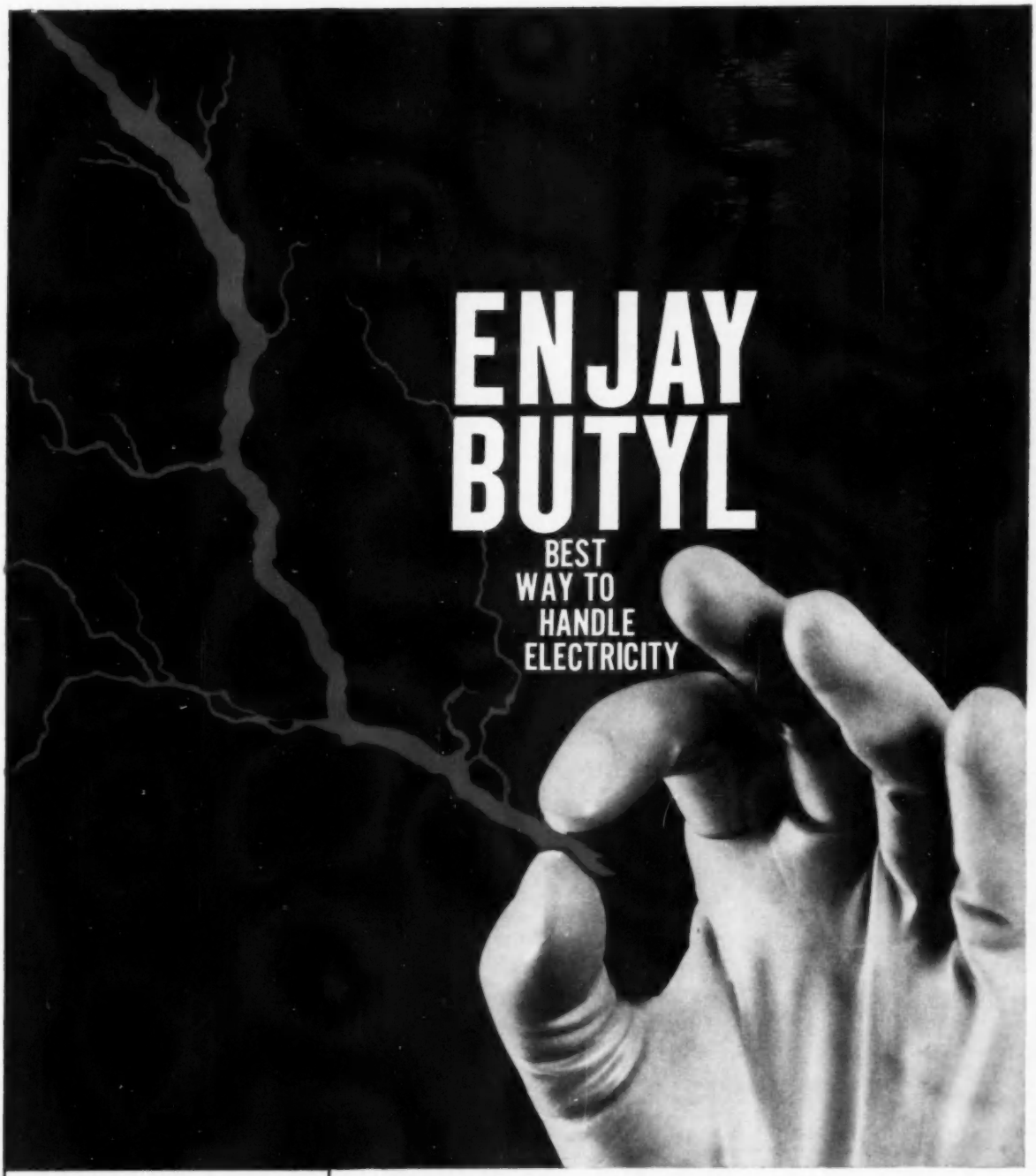

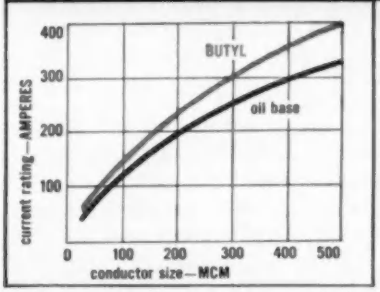

Butyl's outstanding resistance to heat allows considerably higher currents for any given conductor size.

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Car Interiors Combine Beauty and Practicality

(*Continued from page* 81)

day sedan. The interior is complemented by harmonizing Tripoli carpeting.

Ford

Interiors of the 1958 Ford emphasize new, softer pastel shades and richer, softer appearance of fabrics. Vinyls have new deeper simulated graining for a richer leather-like appearance in the Fairlane and Custom series. In the Custom series, the vinyl has a metallic, shantung-grain finish which gives a brushed aluminum appearance. Station wagons offer a choice of either vinyl or woven plastic and vinyl interiors.

A new tweed cloth is featured on the Fairlane 500 Victorias and the Skyliner. The Country Squire and nine-passenger Country Sedan station wagon have new patterns of woven plastic.

Chrysler Corp.

Chrysler Corp. has developed 28 new fabric patterns to complement the new exterior colors and styling of its 1958 cars. Fourteen of the 28 patterns came from the drawing boards of Chrysler Corp. fabric stylists. Other new patterns were developed by outside textile designers.

One of the new fabrics is the Chrysler New Yorker's "Fontainebleau" pattern. This durable, yet soft appearing, puff-finish fabric is accomplished through a new process using saran yarn with natural fibers.

Ventilated vinyl, popular with hardtop, convertible, and station wagon drivers, has a new face for 1958. With this material, vinyl shapes are embossed on fabric to give an easy-to-clean surface, and at the same time, allow air to pass through for driving comfort. Background fabric for De Soto's new "Stardust" and Plymouth's "Sequin" patterns has a porous vinyl coating to make it breathable and cleanable as well.

Buick

Sixty interior trim combinations in a variety of colors and an assortment of fabrics are available on the 1958 Buick line. Convertibles in the new Limited series and Roadmaster 75 series, for example, are trimmed in Cape Buffalo grain leather, with seven combinations available in colors ranging from two shades of blue and green through red, silver and yellow.

Mojave nylon and broadcloth combine with genuine leather in the two- and four-door Rivieras of both the Limited and Roadmaster 75 series, with the nylon and leather combinations available in five color schemes and broadcloth and leather in three.

Century and Special series convertible trims are all cordaveen in five color combinations. An assortment of seven trims also is available in Buick's three estate wagons.

Six trim combinations in nylon and cordaveen are offered in the Super series and seven in the Century and Special custom. Standard

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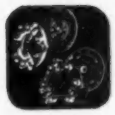

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Power Take-Offs

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You get these patented features—in addition to (1) as many as twenty four heat-resistant, non-set springs to assure even pressure all around the plate and long service life (2) nine large side ports and twenty one holes in the cover to carry away heat, dirt, grease and moisture (3) balanced, function-simplified levers to insure efficient operation in high-speed, high-torque engines (4) cushioning and dampening arrangements to minimize shock-load effect and blot out vibration (5) a wide variety of organic, metalic, or Morlife® friction plates. When you specify ROCKFORD you get ALL of these advantages that enable ROCKFORD CLUTCHES to serve better and longer than any "chinese copies".

BW SEND FOR THIS HANDY BULLETIN
Gives dimensions, capacity tables and complete specifications. Suggests typical applications.

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MATCH THE TOOL TO THE JOB

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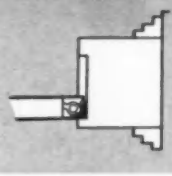
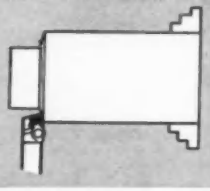
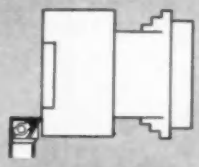


STYLE **SBTR**
HEAVY-DUTY TURNING



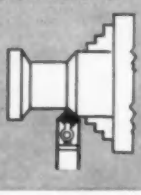
STYLE **TFTR** FACING



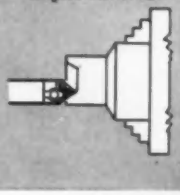
STYLE **TGTR** FACING

STYLE **SFTR**
FACING

STYLE **SET**
CHAMFERING



STYLE **TDTR**
CHAMFERING



WSW 6882

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And Carmet Indexable inserts are available in more than 20 styles and sizes and in six different carbide grades—each insert permanently marked for positive grade identification—to give you *top* cutting performance.

Carmet tool holders and Indexable inserts make machining with carbides practical for any size plant. Match a Carmet tool to your requirements—or let Carmet give you engineering assistance in setting up a complete tooling program—and watch your production climb as costs go down. Inquire today.

• *Allegheny Ludlum Steel Corporation, Carmet Division, Detroit 20, Mich.*

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Expanded to 16 pages, this latest edition contains specifications of Carmet tool holders and Indexable inserts, replacement parts for tool holders, and information on choosing the proper carbide grade for the job.

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trims in the Special series feature three combinations of cloth and cordaveen.

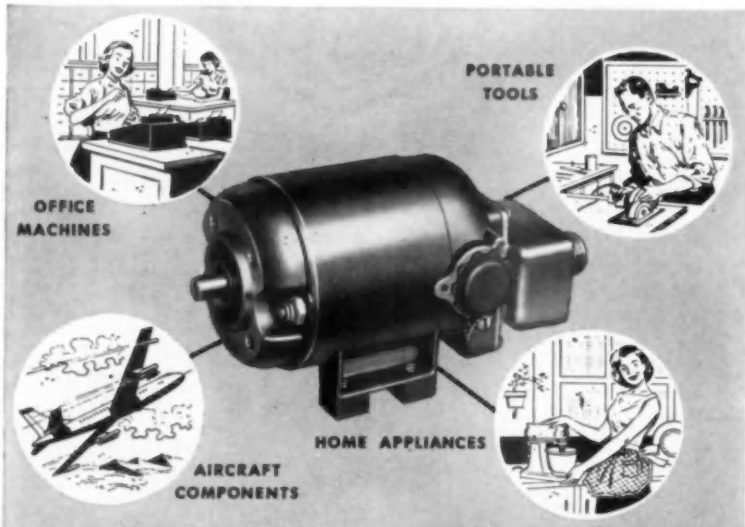
Studebaker-Packard Corp.

A combination of high fashion and safety provides the theme for the re-styled interiors of 1958 Studebaker and Packard cars. The former is achieved through the integration of custom-crafted fabric upholsterings and shantung-styled vinyl trims. Shantung styling gives the vinyl the grained-like, raised, woven effect of tweed.

A new safety feature is introduced in the door panels which are now heavily padded beneath the trim. Metal moldings have been eliminated and replaced by an accent design of raised vinyl.

The President Classic combines fabric insert pleats of a Jacquard woven "Abstract" pattern of Ratine yarns, with finely textured, light-colored nylon bolsters. On the padded door panels, Royal Moroccan grain vinyl accent panels contrast with a shantung vinyl.

The President Hardtop and Golden Hawk models feature a handcrafted look, produced by combining Homespun Tweed fabric interwoven with Ratine yarn, with full-pleated vinyl bolsters. The Commander and Champion Deluxe two-door and four-door models are trimmed with light-toned Jacquard fabrics accented with metallic yarns, complemented by shantung vinyls.



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This motor is representative of the many Lamb Electric motors *specially engineered* to provide:

(1) the dependable power and smooth, efficient operation required for top product *performance.*

(2) the low weight and compactness required for easy portability and good product *appearance.*

These advantages are standard with Lamb Electric Motors, at no increase in cost, because our plant is equipped and organized to *custom manufacture on a volume basis.* May we demonstrate?

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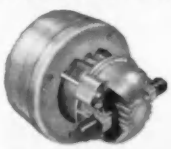
Circuit breaker actuator motor.

Impact concrete drill motor.



Turbine for canister-type vacuum cleaner.

Lincoln and Continental

Interior styling of the 1958 Lincoln and Continental is featured by four new design motifs using 11 different fabrics in addition to vinyl and leather selections. A total of 145 interior trim selections are available in 10 models of the Lincoln and Continental.

Premiere interiors feature four all-nylon cloth combinations in four color schemes, nine leather-and-cloth combinations, and six all-leather options. The Capri interiors are offered in two trim material combinations and four single color themes. The Continental interiors include three all-cloth combinations, eight leather and nylon selections, and six all-leather options. Seven all-leather combinations are available in the Continental convertible.

Cadillac

New fabrics and materials are used in a variety of combinations to provide interior luxury in the 1958 Cadillac. There are 55 interior trim combinations available in this year's line, excepting the Brougham, which has 44 combinations.

The Biarritz, for example, features eight Cape Buffalo grain and metallic finish leathers. The Seville interiors are available in both Cape Buffalo grain leather and in combinations of leather and crest cloth, which is made from nylon faced material with Lurex metallic thread.

The 60 Special also attains new heights of interior luxuriousness. There are 13 interior combinations with this model, including three wool broadcloth in a handsome biscuit and button combination.

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3C CONTROLLED CUMBUSTION CARBURETION

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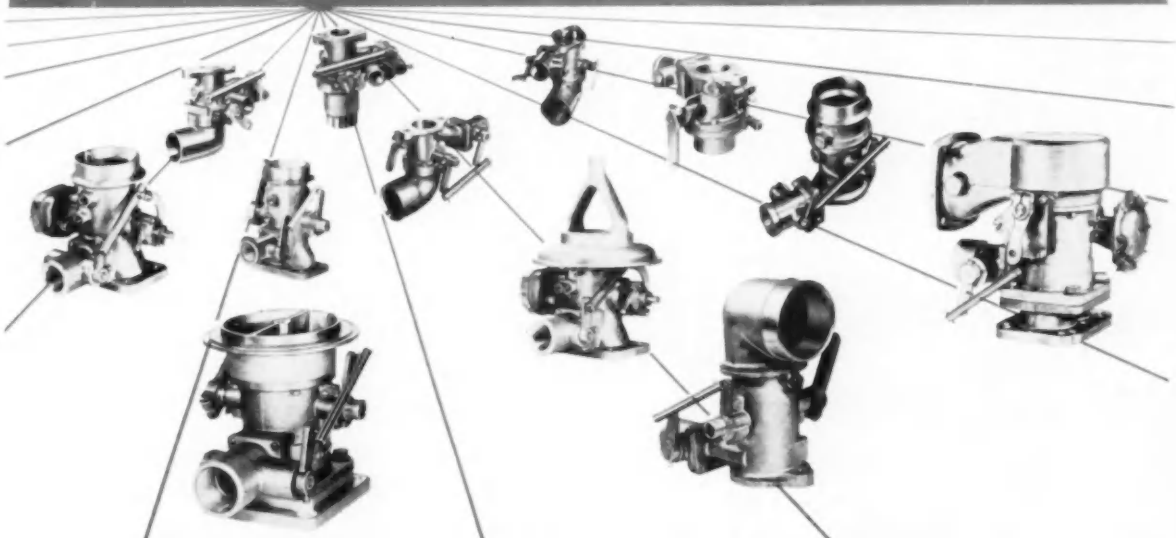

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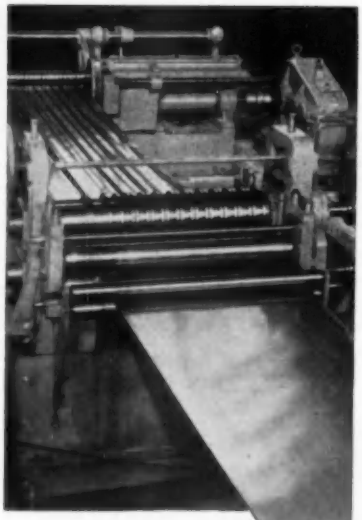

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The Yoder line includes slitters of every size and capacity for coil or sheet stock. Send for the all-new, 1958 edition of the Yoder Slitter Book. It is a comprehensive text on the mechanics and economics of slitter operations with time studies, cost analyses, and other valuable data. Write to:

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Contract Awards

(*Continued from page* 82)

WARD LA FRANCE TRUCK CORP., Elmira heights, N. Y.
Bomb truck, aero 34B—$161,514

WESTINGHOUSE AIR BRAKE CO., Wilmerding, Pa.
Spare parts for C-124B and C-123B series aircraft—$62,092

WHEELABRATOR CORP., Mishawaka, Ind.
Unit, cabinet type—1 lot—$15,676

WHITE, RAY, ELECTRIC PRODUCTS, Centerline, Mich.
Automotive spare parts, replenishment—824 ea—$40,730

WHITE MOTOR CO., Cleveland, Ohio
Truck-Tractor—4 ea—$29,601

WHITE MOTOR CO., Lansing, Mich.
Automotive spare parts, replenishment 12,240 ea—$31,579

WHITTAKER CONTROLS DIV., TELECOMPUTING CORP., Los Angeles, Calif.
Spare parts and technical data applicable to various aircraft—20 to 400 ea—$198,437

WILLYS MOTORS INC., Toledo, Ohio
Trucks—86 ea—$159,461

WRIGHT AERONAUTICAL DIV., CURTISS-WRIGHT CORP., Wood-Ridge, N. J.
R-1820-84A engines for HUS-1 aircraft, R-1820-88 engines for 2PG-3W aircraft—$1,632,738
Afterburners for J65-W18 engines—$813,350

YALE AND TOWNE MFG. CO., Philadelphia, Pa.
Truck, fork lift, gasoline engine driven, 18,000 lb capacity, pneumatic rubber tires, radio interference suppressed—15 ea—$155,189
Truck, forklift, gas, 6000 lb cap.—15 ea—$74,199
Aero 33B Bomb trucks—300 ea—$819,100
Truck, hand, lift, pallet type—$26,862

Rocket Engine Testing

(*Continued from page* 68)

is satisfactory. It is possible to gain a far more detailed picture of the soundness of this joint by the use of ultrasonic testing. In this case, a brief ultrasonic testing development period resulted in an accurate picture of the brazed joint.

Conclusions

In summary, the ideal nondestructive testing engineer is a big man with a big job before him. When we consider the missile and defense development programs, it becomes evident that the job will become increasingly difficult as we have less development time. The design of greatest reliability will not succeed without the assistance of a competent nondestructive testing engineer and quality control program.

COST-CUTTING PRODUCTION TEAM

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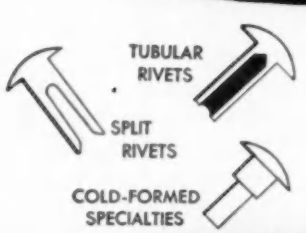

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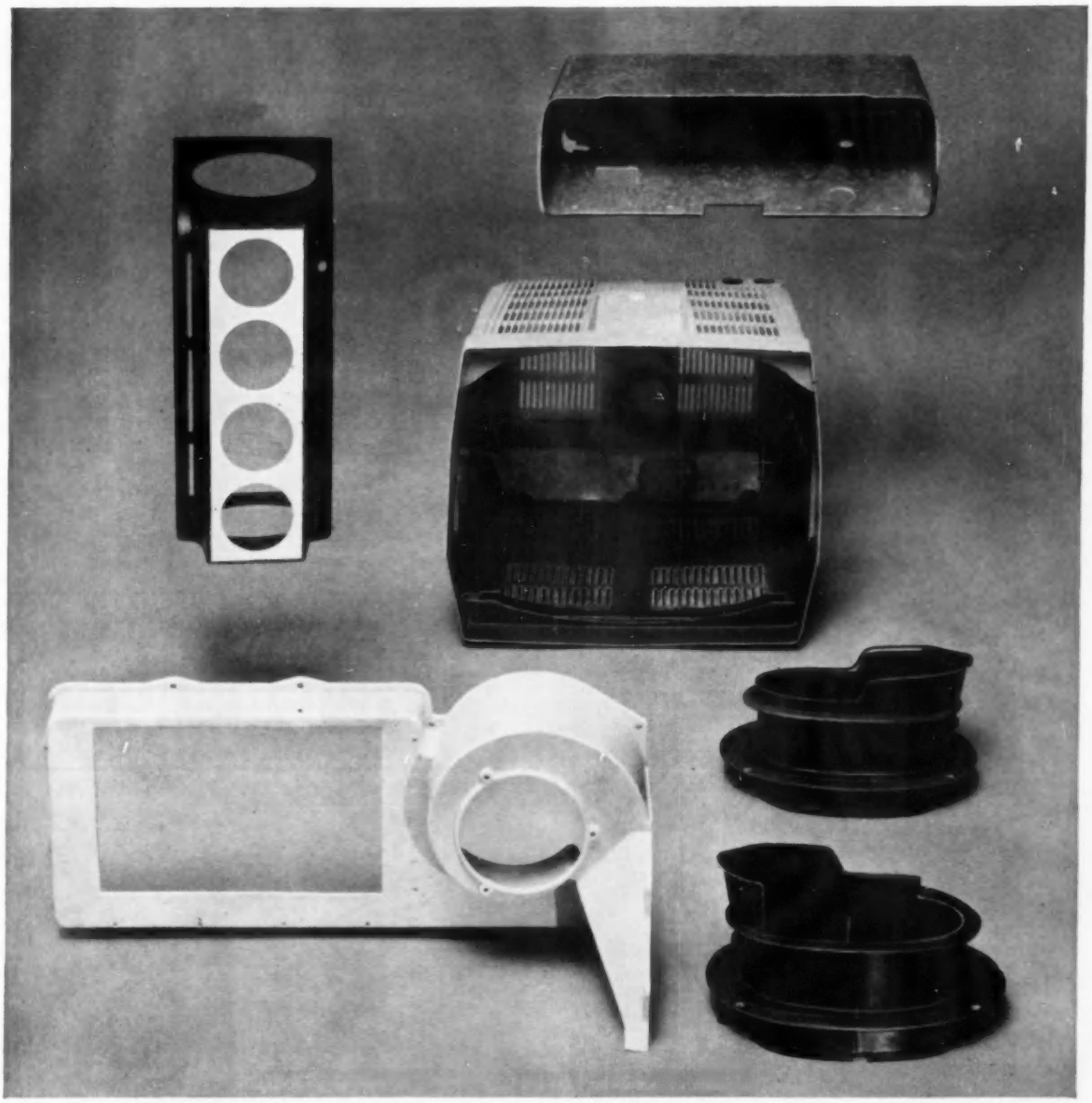

Wide range of premix moldings by the Plastics Division of General American Transportation Corporation includes: automotive air conditioning cabinet for O. A. Sutton Corp., Inc.; Silvertone portable TV cabinet for Sears, Roebuck and Co.; air duct and glove compartment for a leading automobile manufacturer; vending machine air duct for Vendo Co.

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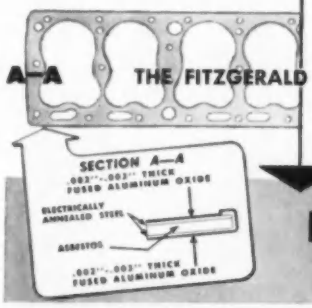

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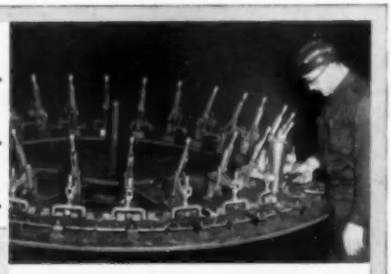

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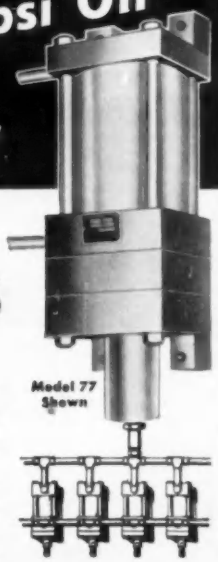

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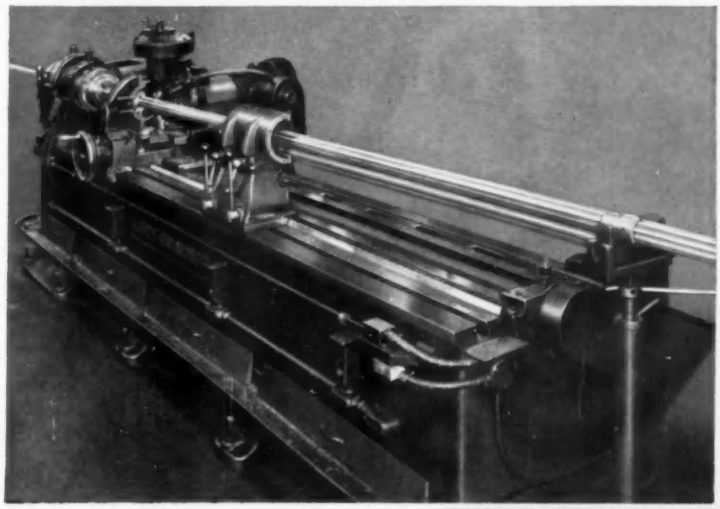

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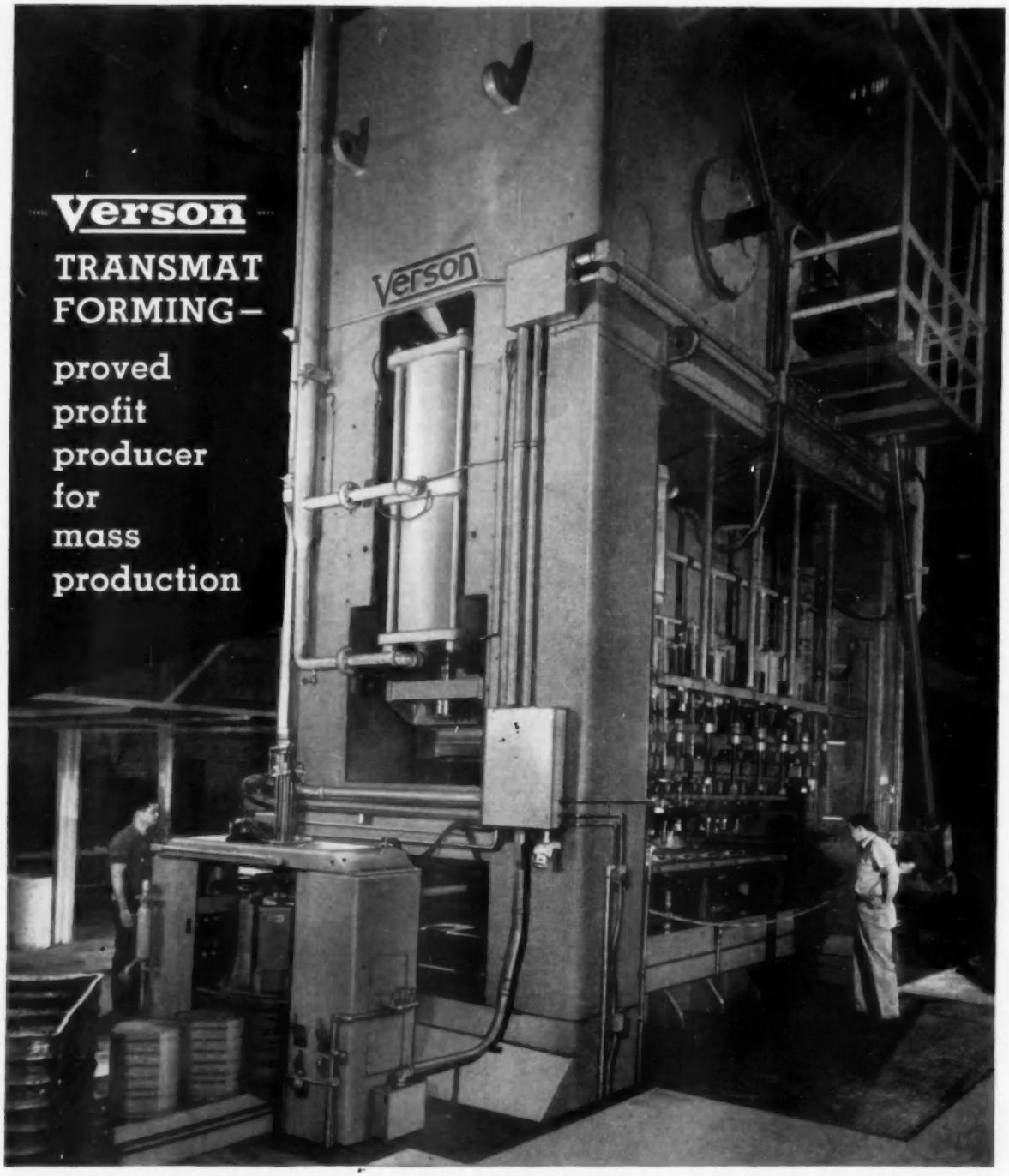

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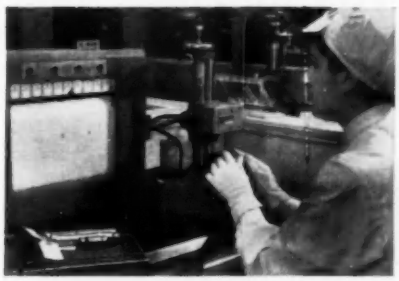

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